ECHNOLOGY DEPT.

Gas Journal

VOL. 288. 108th YEAR. LONDON, NOVEMBER 21, 1956. No. 4871. PRICE 1/6

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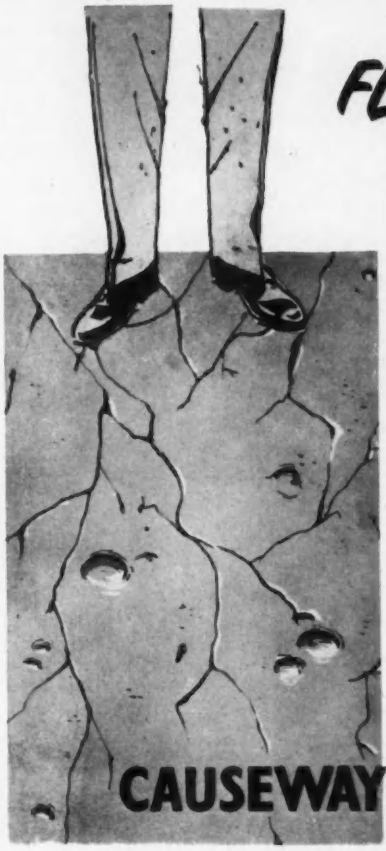

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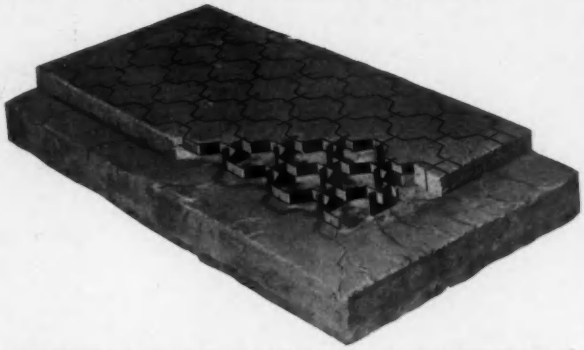
Intensified production outputs are subjecting floors of factories and works to heavy loads, vibration, and heat and are breaking them up, bringing an added burden for managements. See for yourself how Hexmetal strengthens concrete floors.



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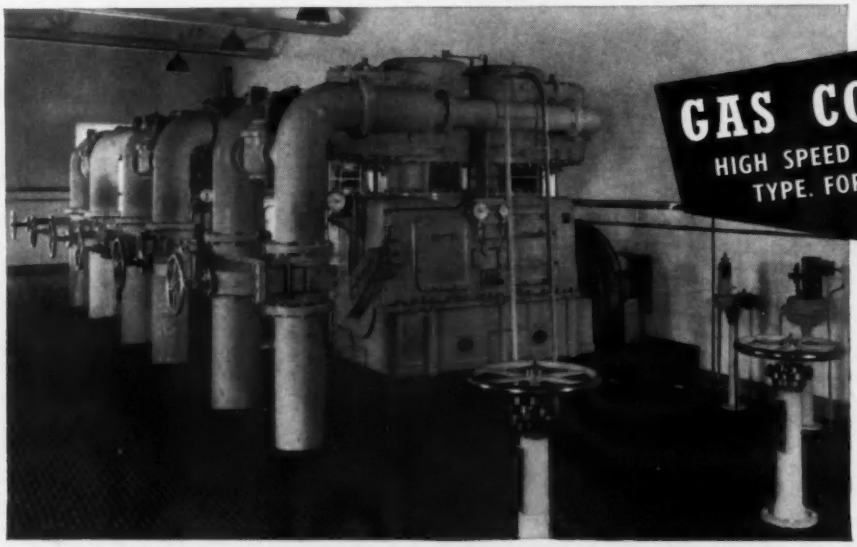

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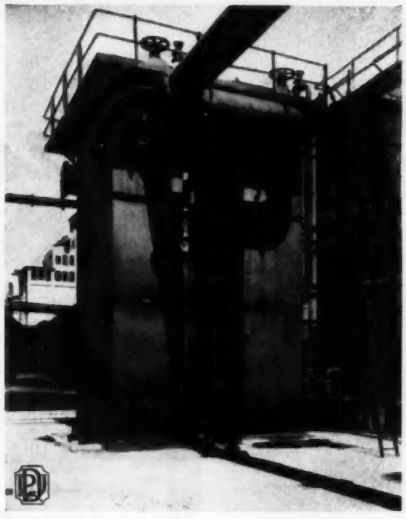

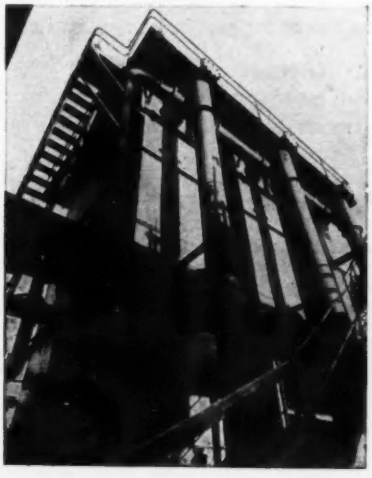

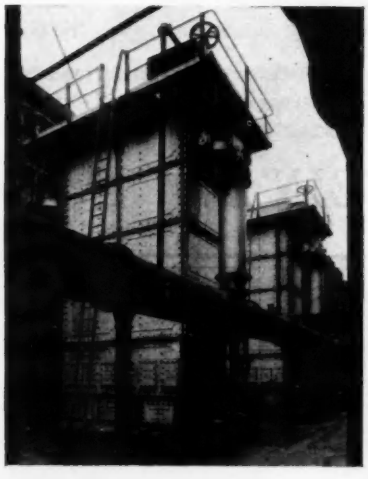

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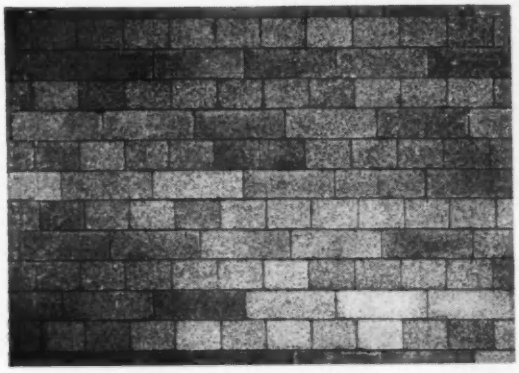

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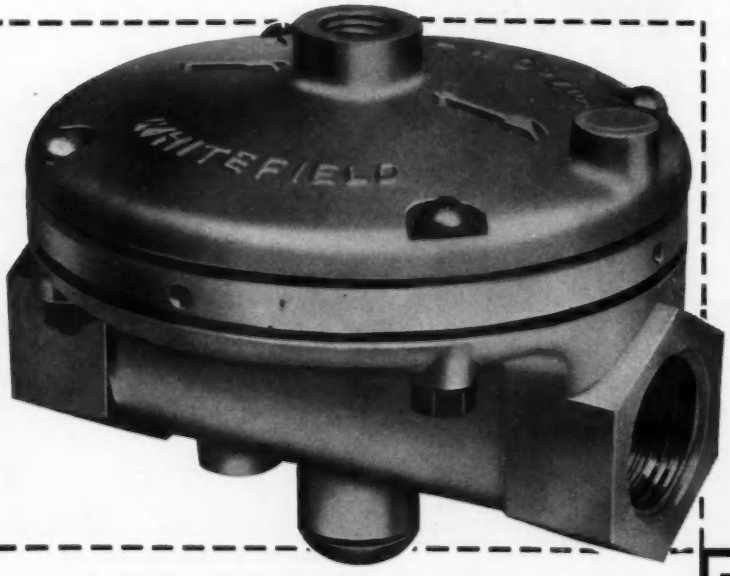

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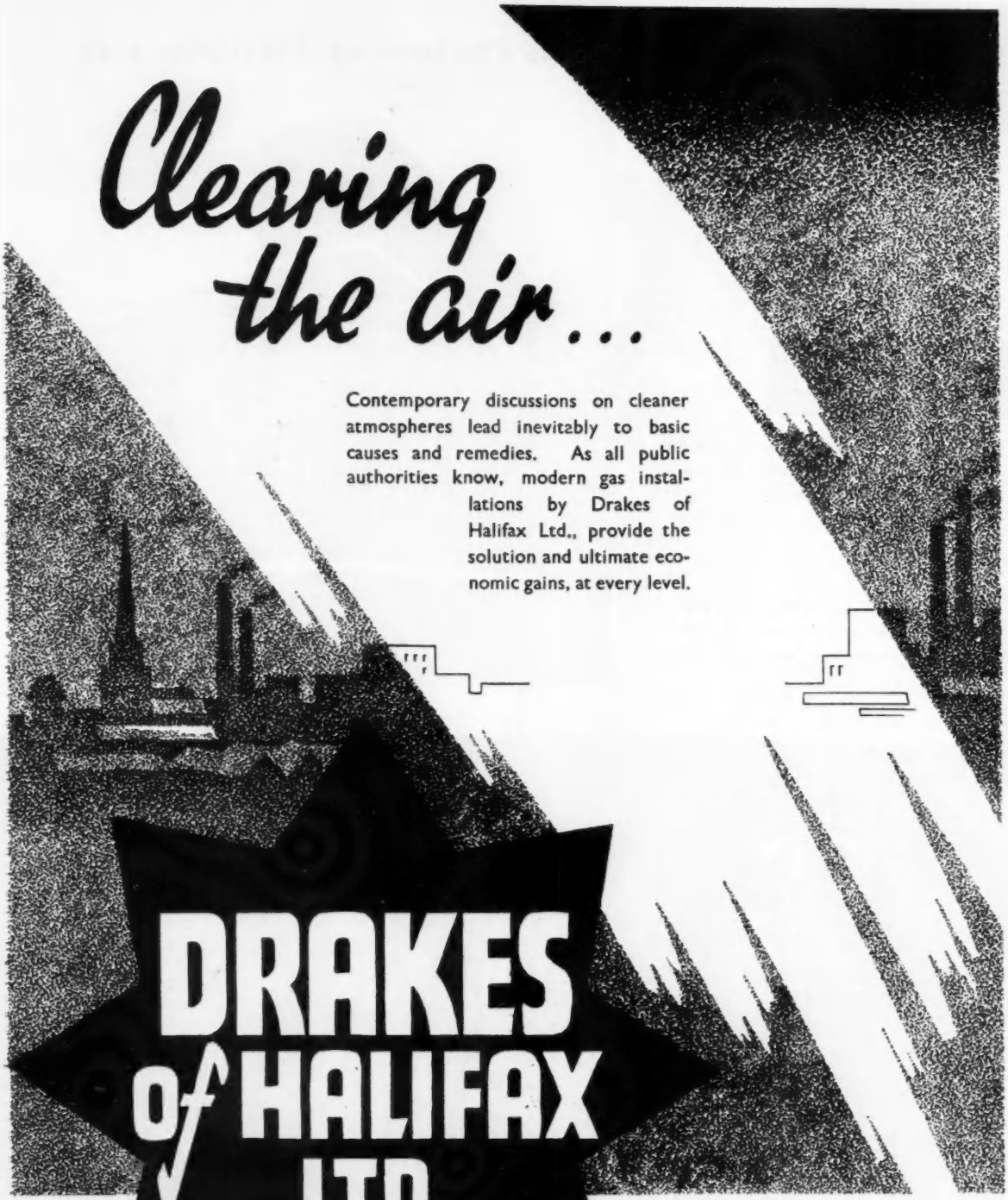

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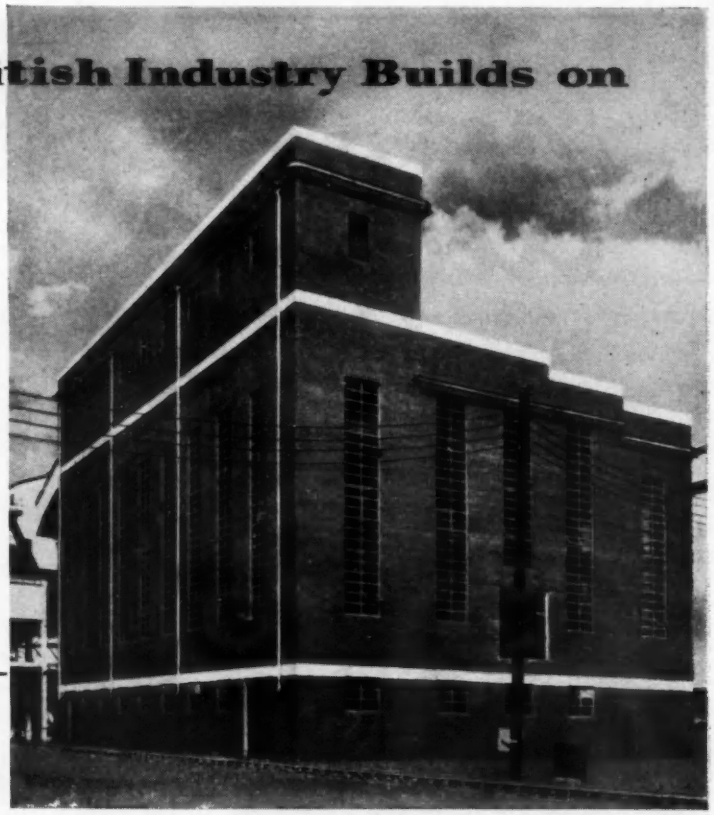

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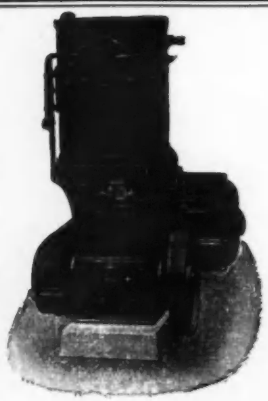

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pressures up to 5,000 lbs. per sq. in.

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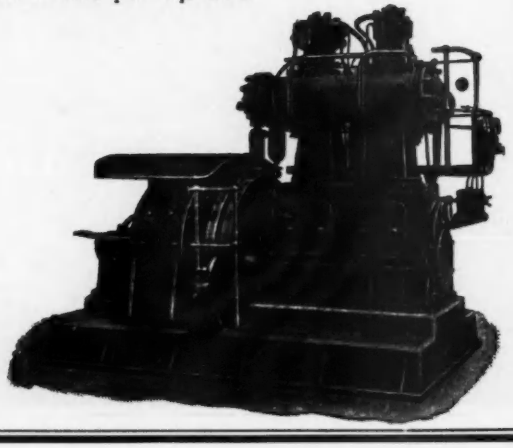

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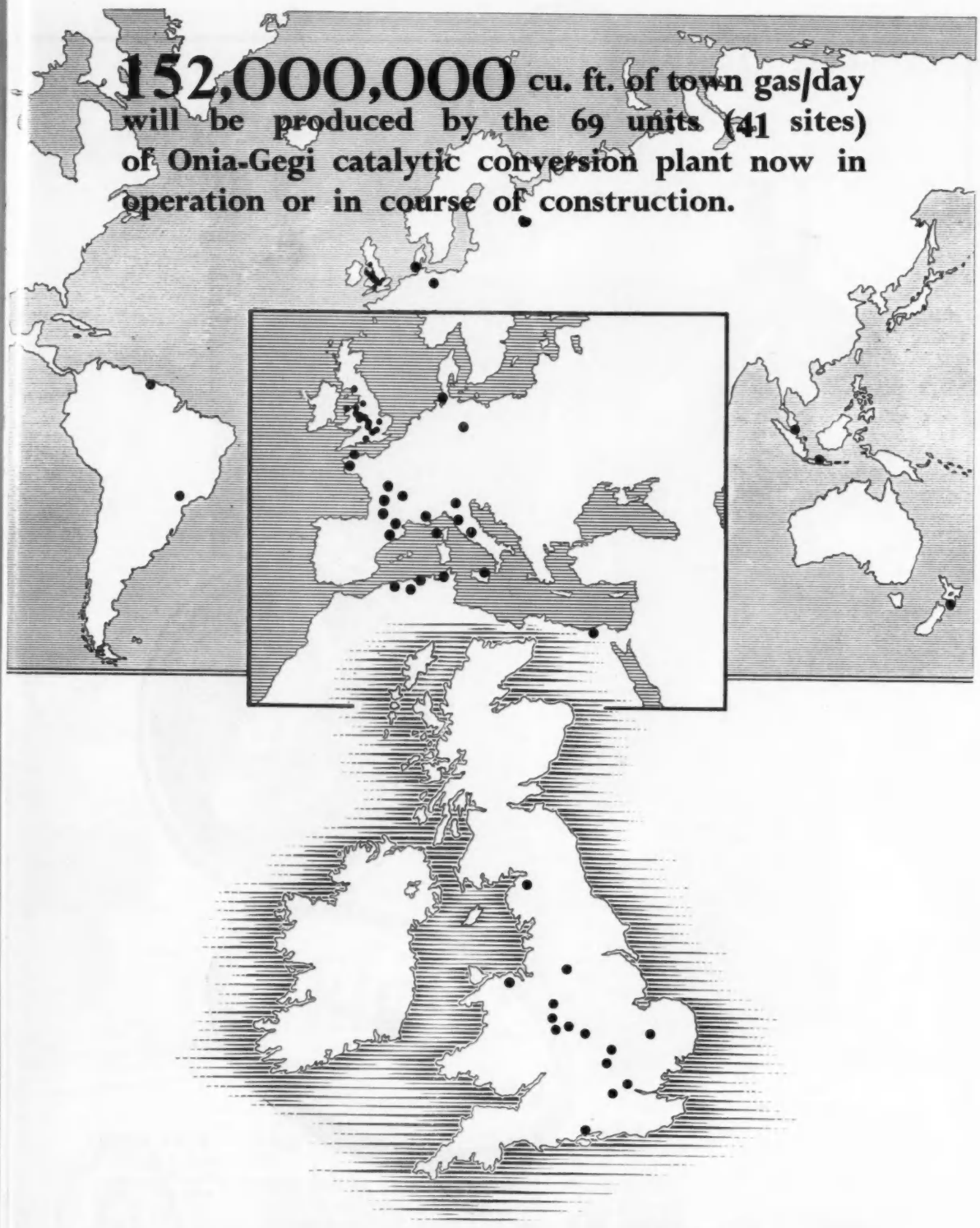

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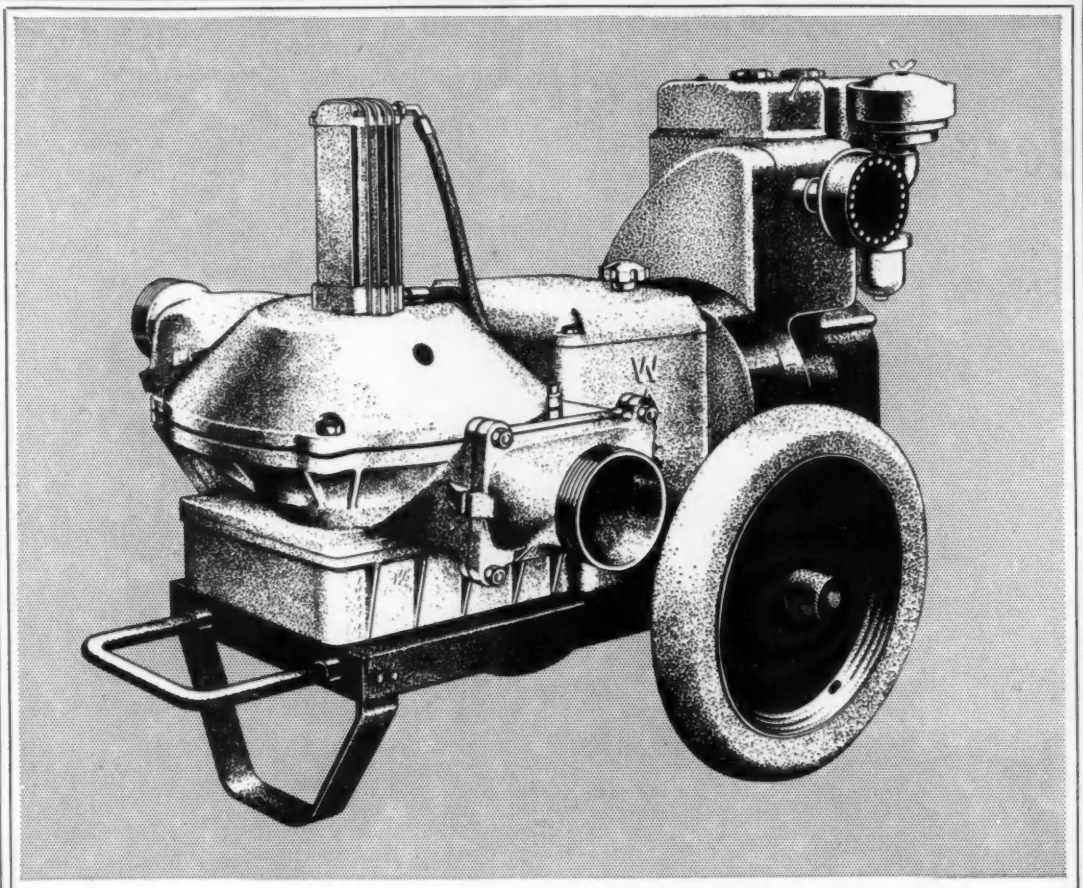

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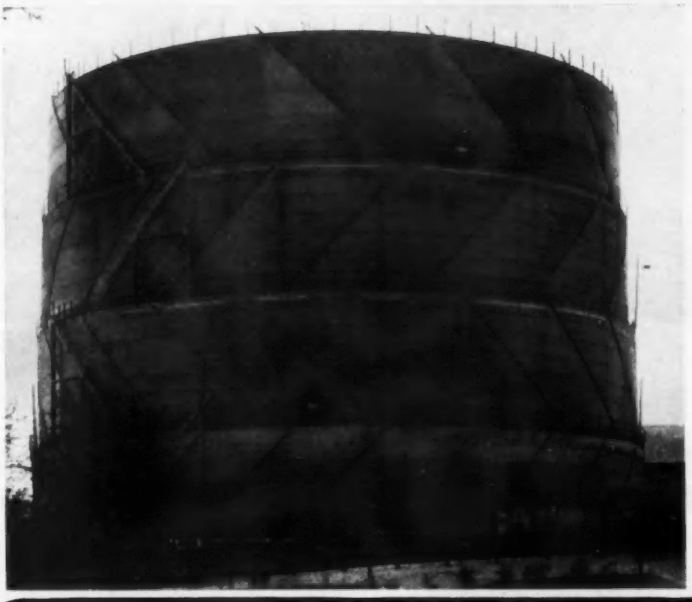

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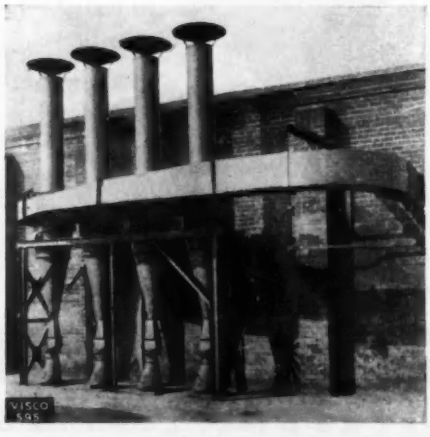

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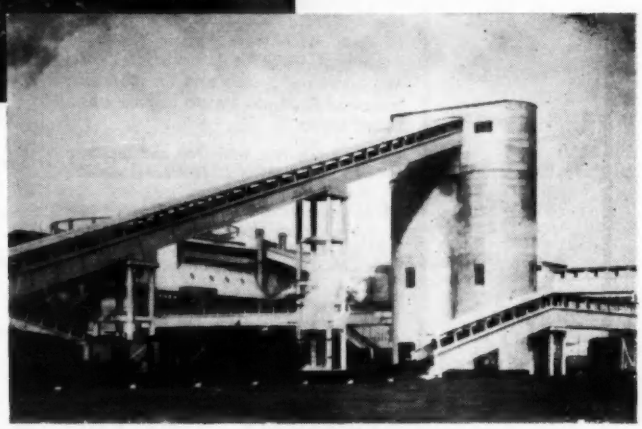

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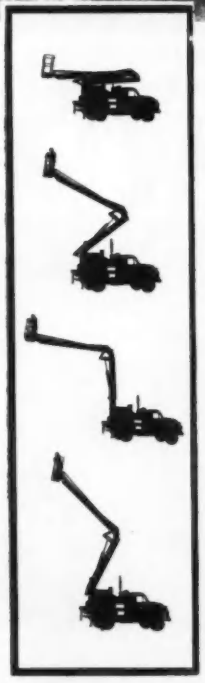

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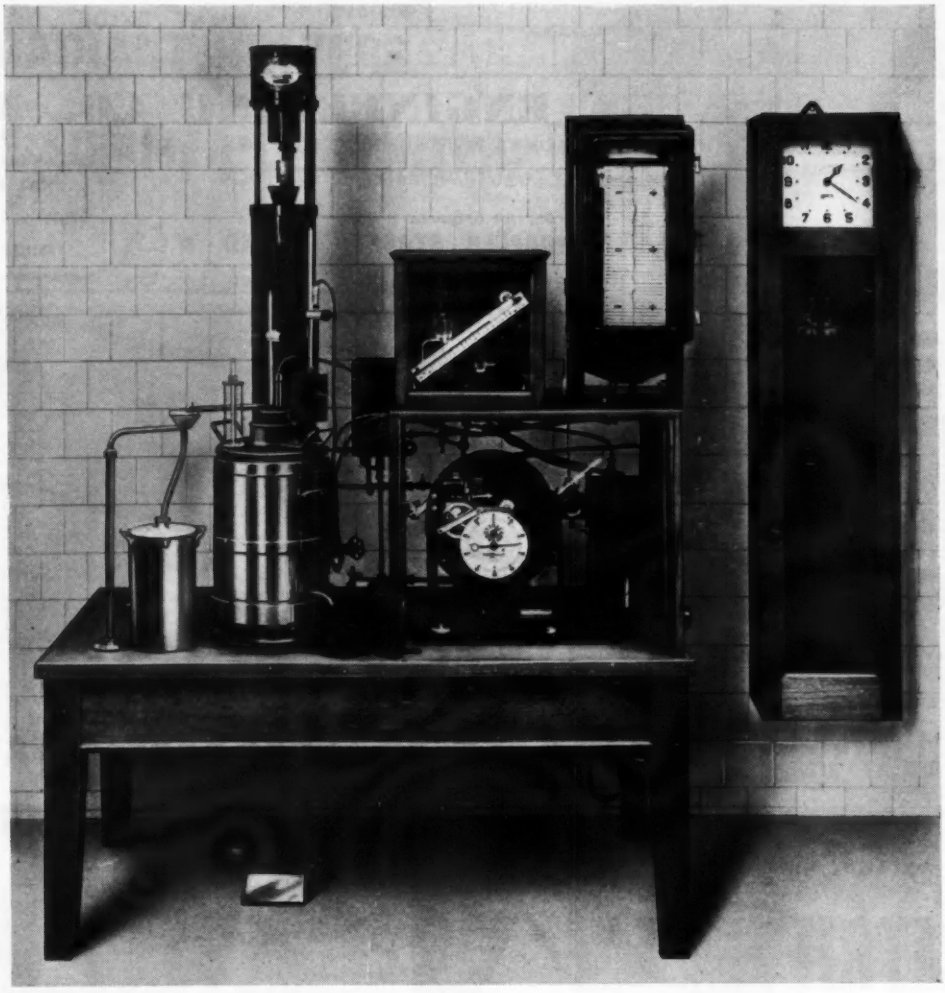
THE — NEW DESIGN

— FAIRWEATHER RECORDING CALORIMETER, MARK II



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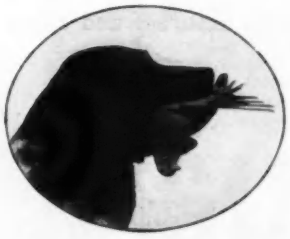
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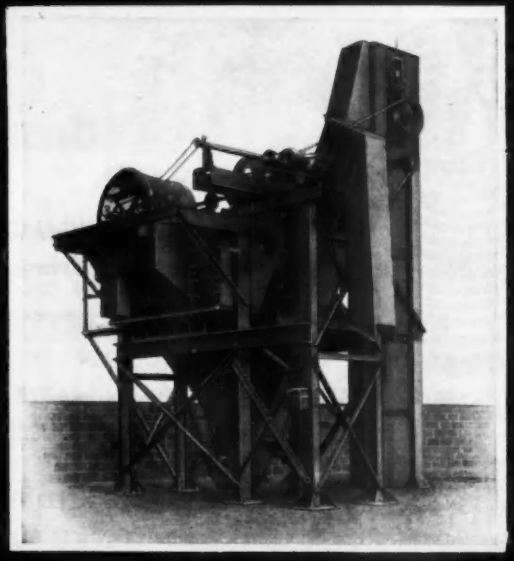
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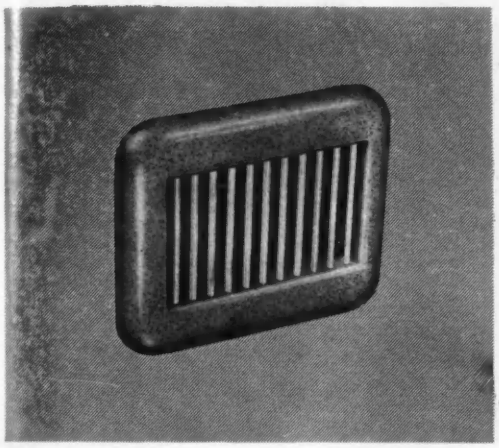

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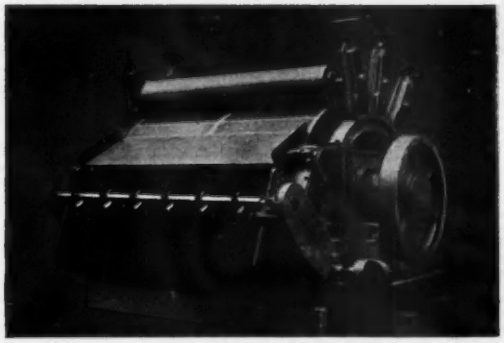

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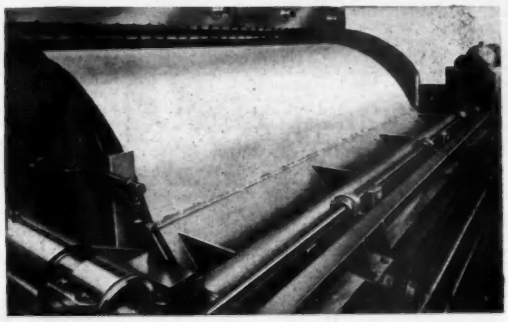

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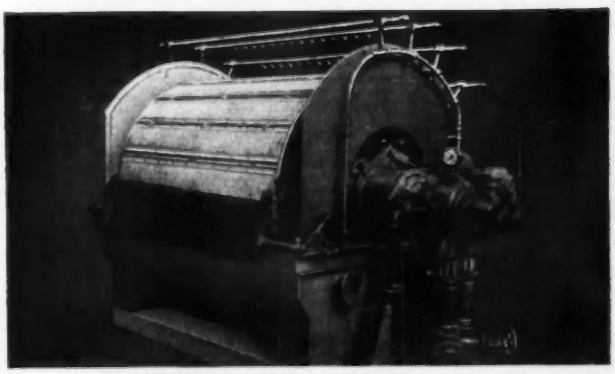

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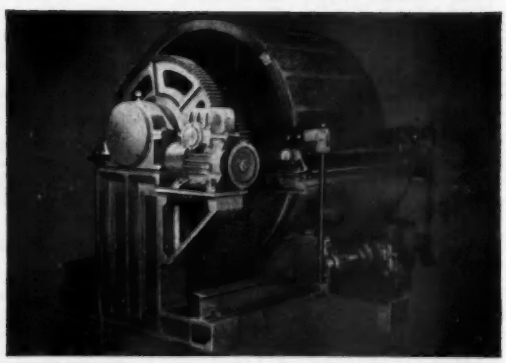

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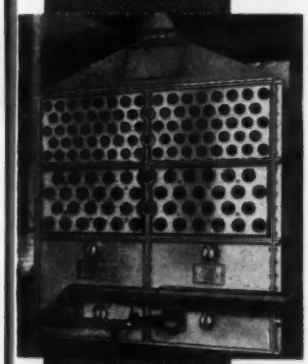

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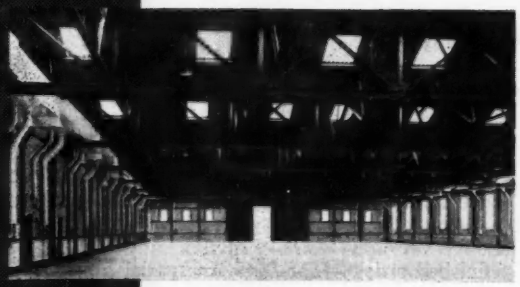

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Gas Journal

VOL. 288 NO. 4871 November 21, 1956

108TH YEAR

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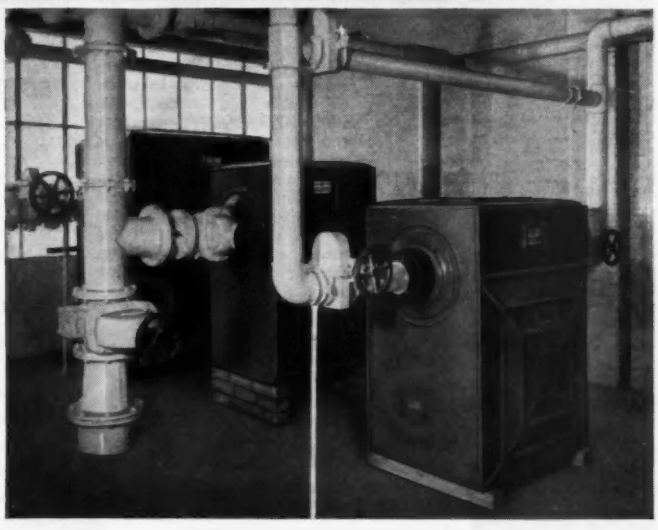

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Gas Journal

VOLUME 288. No. 4871. NOVEMBER 21, 1956. 108th YEAR

Underground Gasification in Russia

IN a recent editorial we said that the Gas Council was 'well, and, indeed, "gracefully" out of, the projects for underground gasification.' And certainly the experiments have been disappointing, despite the fact that they are now thought to merit a pilot plant which will be a N.C.B.-C.E.A. responsibility; so far the Coal Board has only got as far as announcing the formal setting up of an executive to look after their share of the planning and construction.

We have always been aware that the Russians have achieved considerable success with this technique but little was known concerning the extent to which they have progressed. A valuable ray of light has now been cast on the scene by the publication, in *Pravda*, of a paper by the Deputy Chief Engineer of the Underground Gasification Department, and thanks to a most interesting article in *The Times* we have a workmanlike translation.

It would appear that there are at least three or four pilot plants in operation; one (near Moscow) has operated for 14 years, one in the Donbas for eight years. The first has a daily output of gas corresponding to 400 tons of coal a day, and produces a gas of fairly low calorific value. A new plant has been opened this year in the Kuzbass to produce gas of a higher quality. In general the process used seams on the lines which Britain is following; but a new method has been introduced at a new pilot plant this year where the boreholes are all drilled from the surface. They are now passing from the pilot plant stage to industrial operation. A plant is being built near Moscow in conjunction with a gas turbine electrical power station, and its production of gas will be equivalent in heating value to 220,000 tons of coal a year. At Angren, in central Asia, a still larger plant is being built, again for power supply, with a gas supply equivalent to 700,000 tons of coal a year.

A study has been made of the relative costs of producing power in thermal stations based on coal on the one hand and gas produced by underground gasification on the other. The result is strongly in favour of the second method, which according to the figures requires 50% less building, 40% less metal for boilers, 30% less capital investment, 37% less expenditure on maintenance wages, and results in 28% reduction in total power cost. Listing all the as yet unsolved technical problems—avoidance of coal and gas losses, improvement in quality of gas, methods of automatic control—the writer complains that too little interest is being shown in the new construction. One of the industrial scale plants was started in 1950, the other in 1952, but neither is yet complete. Nevertheless, there are 'at present 600 scientists, engineers and inventors working on all aspects of the scientific foundations of the technology.' (*The Times* points out that in Britain the number at work is in the region of 20.) The author of the paper, who is obviously an enthusiast of the first order, maintains that the significance of the process 'is comparable only to that of utilising atomic energy for peaceful purposes.' In Russia, however, in discussing the construction of new plants members of Gosplan and other competent authorities are demanding proofs of the profitability of such schemes.

It seems that they forget that such proofs are only forthcoming from the working of large industrial plants, and without these proofs there is a distinct reluctance to go forward and build the full-scale plants. In this way a vicious circle is being created.

The Russians hope that underground gasification may entirely take the place of coal mining, and thus do away with all the expense and heavy work involved in mining and probably a great many of its dangers as well. But one of the drawbacks of the process is the low quality of the gas. It is after all at best only an outsize producer in which the fire has been lit in the coal seam and air is blown in to keep the fire going and to generate the low quality gas.

The quality of the gas is so low in fact that included in the Russian scheme is an installation of gas turbine electricity generators. In England it might not be considered worthwhile to adopt the scheme on quite such a wide scale as is being done in Russia for that very reason. Until some really successful way has been found of up-grading this gas it seems unlikely that any seams outside those which are impossibly expensive to

mine by ordinary means would be considered for gasifying by this process.

Ideas have been put forward for using pure oxygen and steam instead of air, and it is being considered as the logical development of the Lurgi process. It might even be considered as a possible development that this process be used in the synthesis of oil. This, however, is a distant possibility and would only be the result of very intensive experiments.

The Gasworks Beautiful

FROM time to time we have ventured outside the realm of engineering efficiency and proferred a few comments on more æsthetic matters. And we have even had the temerity to suggest that gasworks architecture has virtually nothing to commend it except functionalism, whereas certain electricity power stations exhibit a marked respect on the part of their designer for simplicity and for proportions which almost deserve the adjective 'noble.' In this belief we are not alone, and we noted with interest the comments of Mr. Gontran Goulden in his presidential address to the Architectural Association. Mr. Goulden has this to say about the architectural design records of the C.E.A. and the Gas Council: 'The Central Electricity Authority has a record of sober improvement not only in the design of its power stations but also in landscaping and planting round them. The Gas Council, on the other hand, has never even aimed any higher than the pages of the less glossy women's weeklies. Its architecture in general defies description. There is, however, one exception to its sorry record. The South Wales Gas Board has a design policy and, I believe, a design committee. I wonder whether the Gas Council knows about it.'

In defence of the gas industry's architectural policy (assuming it has one) it might be said that a gasworks consists not only of a retort house but, from the point of view of shape, an oddly assorted collection of plant. Containing this plant within a satisfying overall structure would be not only a difficult, but an extremely costly, business. It might also be hinted that if Mr. Goulden's knowledge of architecture is anything like his knowledge of gas boards it need not be taken very seriously! However, we cannot get out of it as easily as that. Mr. Goulden is not President of the Association for nothing and his words almost certainly reflect the general consensus of opinion in architectural circles. With the gradual closing down of smaller works and the birth of 'super works' there may yet be time to redeem ourselves in the eyes of our architectural critics.

Of course, the gasworks is not the only example of gas industry architecture. There is the gas showroom and there, surely, we deserve some measure of respect, notably in relation to the showrooms constructed since the war. Even today in certain areas there persists a type of design—or is it an attitude of mind?—which has been aptly described as 'vaguely institutional,' but it is passing. The thing to remember is that, whether we like it or not, gasworks and even gas showrooms have a firm place among the subject matter and patter of the music hall comedian. We have a special reason for trying to give an impression of modernity, and difficult as this is with limited capital and a somewhat mixed inheritance, a general acceptance of the *need* for improvement is surely the first step.

Another Fuel Crisis

WHAT are the fuel oil consuming industries going to do now that the 10% cut in petroleum products extends to their domain? Obviously they will be on the look-out for the most suitable alternatives—which are themselves having to stand up to the strain placed on their normal demands. These change-overs may not be temporary ones, because one obvious effect of the Suez crisis has been to introduce price increases in the oil market and there is no reason to believe that this trend will not continue. Already the Shell Petroleum Company has raised the price of Venezuelan heavy fuel oil, and others have also announced some increases on their imports.

Are they kicking themselves now, those industrialists who converted from gas to oil on grounds of price? The gas industry has been losing a fair amount of the baking and similar markets recently for this reason. This could be understood, as no industry can exist nowadays unless it is prepared to cut its costs to a minimum. But provided the gas industry itself is not in any way incapacitated by the shortage of oil (i.e., provided sufficient coal can be obtained to compensate for loss of oil gasification output) this is precisely the time to consolidate those loads which were jeopardised by the low price of oil—and that includes central heating.

From the text of a statement issued by the Gas Council, it can be clearly seen that, so far as *maintaining* supplies of gas to satisfy normal demand is concerned, it is not worried. 'By adjustments in materials used in production, no difficulties will be encountered in maintaining gas supplies.' Which is, of course, reassuring to the existing customers. But already, to take an example, the glass industry, which used about 211,000 tons of oil last year, is looking round for an alternative fuel to make up for its 10% oil cut. If we can do anything about helping industries like this, even to relieve their predicament in part, we shall be going a long way towards consolidating our sales efforts when supplies of oil are restored.

Cheque Endorsement

THE Committee on Cheque Endorsement has presented its report to the Chancellor. It says: 'Our assessment of the weight of work done in connection with endorsements is that a large amount of unproductive effort is expended in relation to the provisions of a statute which was formed to meet conditions very different from today's. We think that if a way can be found to reduce present labours without involving corresponding disadvantages its adoption would be well worth while.'

Readers may remember the reasoned pleas of Mr. J. R. W. Alexander, C.B.E., in our correspondence columns in 1954 and 1955, that the endorsement of cheques paid by the payee into his bank should be abolished. Mr. Alexander, who was writing on behalf of the Chartered Institute of Secretaries, was Secretary of the Institution of Gas Engineers from 1929 to 1937 and General Manager of the British Gas Council for a time prior to vesting date. He is now Executive Chairman of the Gas Officers' Guild. After agitation in the Press and elsewhere, Mr. R. Graham Page, M.P., introduced into the House a private member's

ill designed to reduce the need for endorsement, and the Committee for Cheque Endorsement was set up.

The Committee, summarising its deliberations in the report, say they have considered a number of methods by which work on endorsement might be reduced by the increased use of other instruments in place of order cheques. These methods were the introduction of a new non-negotiable instrument, the extended use of crossed bearer cheques and the wider use of the traders' credit system. Their opinion was that none of these methods offered the prospect of a really satisfactory solution. What they do recommend is: 'That a substantial saving of unproductive work would be achieved, and the present system would be appropriately adapted to modern conditions and needs, if it were arranged that endorsement was no longer necessary on a cheque being collected by a bank on behalf of a customer who was the payee. We recommend a change of the law to this effect making it clear that collecting banks should not suffer any loss of protection thereby. . . . We recommend that arrangements should be made so that dividend and interest warrants, bankers' drafts and other comparable instruments could be accepted for collection and paid by banks without the payee's signature in the same circumstances in which the endorsement of cheques would under our recommendations become unnecessary.' Concluding the report is an appendix recommending a form of possible legislation.

Let us hope some action is taken now: Certainly it is disquieting to realise that, according to one estimate, 600 mill. cheques endorsed yearly require examination 1,100 mill. times by the collecting and paying banks, and that the cost has been estimated as exceeding £500,000 and the man-hours spent 1,750,000.

Marriage of Convenience

TIME was when traffic in the Border country around Berwick was generally on a warlike footing, and Scot and Saxon showed little disposition to regard each other as anything but born enemies. Then the chief export was fire and pillage. In later years a more peaceful and tender change came over the scene. The first house in Scotland on the Great North Road, at Lamberton Toll, was invested with some of the glamour that recently was Gretna's, and England exported romance in the shape of runaway marriage couples.

Now the wheel has made another turn, and England is exporting gas to these historic regions. Two of the Scottish Border works have been closed; the distance is too great to supply them from any other Scottish station; so bulk supplies are being received from Berwick. It is the first Anglo-Scottish link-up in the history of the industry, and a tribute to the co-operation and far-sightedness of both the Northern and the Scottish Gas Boards.

The visible sign of the 'marriage' of these two Boards is a tiny meter-house standing in the shadow cast by the old toll-house where the old-time romantics were joined. There may be something significant in that.

Exhibition for Industrialists

IT would appear that the continued expansion of the industrial load is encouraging gas boards to invest in publicity designed to build up the load still further. A rather expensive sprat which should catch an outsize mackerel has been devised by the North Thames, South Eastern, Southern and Eastern Boards. This is an exhibition entitled 'Gas at Work in Industry,' which will be held at the Royal Horticultural Hall, London, from January 22-February 2, 1957. The exhibition will consist of working models and demonstrations and its main purpose is to show the large variety of modern processes in which gas plays an important, and often an essential, part.

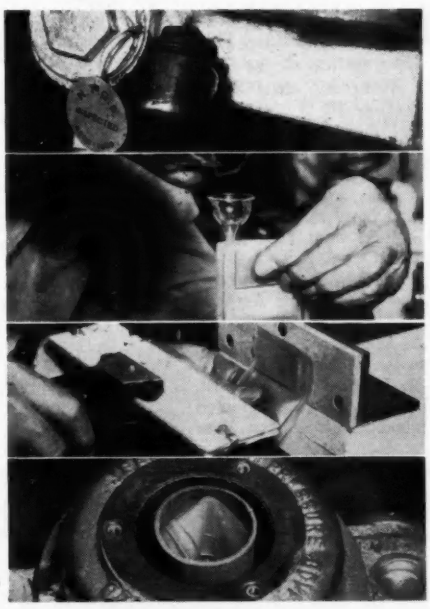
Exhibition space and stands will be free to the 70-80 exhibitors and the exhibition will be staffed by representatives from the four Boards. Emphasis will be laid upon shell moulding and other new developments and the exhibition will be advertised by means of posters and a special box in Gas Council industrial advertisements. However, the essential point is that personal invitations will be sent to every important industrialist in the areas concerned and the exhibition will have the great virtue of getting those customers who matter exactly where the gas industry wants them. This is not meant to imply strong-arm tactics, but it does mean that the boards will have a hitherto unequalled opportunity to show their customers and potential customers the unique merits of gas as a fuel for industrial heating.

Plastic Sachets for Mercury

DURING the few brief weeks of its existence the North Thames Gas Board's testing laboratory at the central stores, Brentford, has already produced an interesting development in connection with high pressure governors.

It had been the practice to put the measured amount of mercury required for each governor in a malleable iron cap which was then sealed with a malleable iron plug. The cap and plug were then fixed to the governor by wire passing through a hole drilled in the plug. This arrangement is shown in the first illustration and this is how it was sent out on to the district. The plug had to be unscrewed in a vice and sometimes mercury was lost in the process. There were also losses of caps and plugs.

Mr. W. J. Gooderham and Mr. R. C. J. Maltese, of the laboratory staff, have developed an alternative method using an expendable plastic sachet for sealing up the mercury. This takes the form of an L-shaped container made from two pieces of thin P.V.C. sheet. A measured amount of mercury is poured into the sachet through a funnel as shown in the second illustration, the top of the L then being sealed with a tool having an electrically heated edge, as shown in the third illustration. Finally, the satchet is folded and put in the cardboard circle which is normally supplied in the top of the governor, as shown in the fourth illustration. The fitter has to take the top off the governor when he fits it on the district. He lifts out the container and cardboard, cuts off the top of the L shape and it is then a simple matter to pour the mercury into the appropriate seal using the narrow part of the L as a funnel.



The total cost of the container and sealing operation is only about one-third of that of the plug and cap. The sachets can be used more than once, are inside the governor in transit and are strong enough to resist quite violent treatment.

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Personal

MR. D. WRIGHT has vacated the Chairmanship and has ceased to be Managing Director of SIDNEY FLAVEL & CO., LTD. MR. T. C. L. WESTBROOK, C.B.E., has been appointed Chairman, and MR. J. ALLEN and MR. F. M. ROGERS, Joint Managing Directors.

MR. JOSEPH H. RACE, who for the past seven years has been District Engineer and Manager of the Scarborough office of the North Eastern Gas Board, is to retire in February. Mr. Race was previously Managing Director of the Scarborough Gas Company, a position which he held from 1946 until the Company was nationalised in 1949.

MR. R. C. HERON has been appointed Secretary of Cochran & Co., Annan, Ltd., owing to the retirement of MR. A. M. DOUGAN, who has been Secretary of the Company for 38 years.

AIR CHIEF MARSHAL SIR ARTHUR SANDERS, G.C.B., K.B.E., of London, W.8, has been appointed a part-time member of the North Thames Gas Board.

WESTERN JUNIORS VISIT C.E.A. POWER STATION

MEMBERS of the Western Junior Gas Association visited the East Yelland generating station of the Central Electricity Authority, near Barnstaple, on November 10.

The station, on the River Taw, was opened last year by Earl Fortescue. Coal from Wales is unloaded from colliers by modern telpher cranes, and all water requirements are met from the river. The remote control system was of particular interest to members.

Following the visit Mr. D. J. Maunder, immediate Past President of the Association, thanked Mr. Metcalf, Station Superintendent. Members then reassembled at the Royal Hotel, Bideford, where Mr. D. R. Jones, Chief Chemist, Stapleton Road Works, Bristol, presented a paper, 'Chemical Control of a Base Load Works.'

The paper outlined the various chemical controls and tests on a large works necessary to ensure efficient operation of all plant, safety in operation, and sampling of coal.

OXYGEN PROCESSES IN METALLURGY

Gibbons Brothers Ltd., a subsidiary of Gibbons (Dudley) Ltd., has acquired an interest in Metallurgical Oxygen Processes Ltd., of London, which has developed processes for the heating of metals without scale or oxidation.

The present directors, Dr. A. G. E. Robiette and Mr. J. Miles, remain on the Board.

N.T.G.B. TEAM TAKE PART IN NATIONAL FIRST AID CONTEST

North West Board Send First Women's Team

THE North Thames Gas Board team represented the gas industry in the men's first aid competition for the Grand Prior's Trophy organised by the St. John Ambulance Association in London, on November 15. There was also, for the first time, an entry from the industry in the women's section where the Liverpool team of the North Western Board competed.

The opposition is the strongest of its kind in the country and the men were only able to get ninth place; the women took fourth place in a field of eight. North Thames totalled 278½ marks out of a possible 400. The winners, Metropolitan Police L. Division, scored 337. The winning women's team, the Spalding section of the St. John Ambulance Brigade, scored 333 points for their win and the Liverpool team from the North Western Gas Board, 278.

Half of the score of 400 can be gained from individual tests in which pairs from the teams compete; the marks awarded in these tests often decide the result as much as the more spectacular team trial. The Liverpool girls only scored 118 in this section. The North Thames team, however, did well in this division scoring 149½. In the team test they lost marks by being behind time.

The judges admitted that the tests were 'tough' and that the workmanship was of a high standard, although there was criticism of somewhat hurried and rough handling of patients in both individual and team tests. It was stressed that there was enough time to give first aid effectively within the prescribed limit.

This was the seventh competition of its kind for men and the sixth for women. From their initial stages over 20,000 competitors have been engaged.

General Sir Sidney Kirkman, G.C.B., K.B.E., M.C. (Director-General, Civil Defence), who presented the trophies, urged the necessity for the recruitment of more volunteers to train in first aid and home nursing and appealed especially to women to take up this work. There were at present over 1 mill. first aiders in the country, but this was not adequate.

Runners-up in the men's section were, Fulham section, British Electricity Ambulance Centre, score 302, second; and Bristol, British Transport Commission (Railways and Docks), score 301, third. In women's section, Baker Street (London Transport), score 306, were second; and North Area T.M.O. (General Post Office), score 297, third.

Diary

November 22.—LONDON AND SOUTHERN JUNIORS: All-day visit to Lewis Berger (Great Britain) Ltd., Morning Lane, London. 10.30 a.m.

November 26.—EAST MIDLANDS G.C.C.: Committee Room, Gas Offices, Council House, Birmingham, 3. 2.30 p.m.

November 26.—SOUTH EASTERN G.C.C., SUSSEX DIVISION: Education Offices, 54, Old Steine, Brighton. 2.30 p.m.

November 28. — ROYAL SOCIETY OF ARTS: John Adam Street, Adelphi, London, W.C.2. 2.30 p.m. The Alfred Bossom Lecture on 'Air Conditioning of Buildings,' by J. S. Hales. Applications for tickets should be addressed to the Secretary of the Society.

November 28.—INSTITUTE OF FUEL: The Institution of Civil Engineers, Great George Street, S.W.1. 5.30 p.m. Lecture on 'The Cost in Britain of Air Pollution from Different Types of Source,' by R. S. Scorer.

November 29.—I.G.E. EASTERN SECTION: Council Room of the Institution of Gas Engineers, 17, Grosvenor Crescent, London, S.W.1. 2.45 p.m. Paper by I. Gillespie, 'Gas and Oil Exploration in Britain.'

November 29.—MIDLAND JUNIORS: Visit to works of Accles & Pollock Ltd., Oldbury, Birmingham. 2.30 p.m.

November 29.—INSTITUTION OF CIVIL ENGINEERS: Dr. W. H. J. Vernon's Lecture on 'Metallic Corrosion and Conservation.'

November 29.—SOUTH EASTERN G.C.C.: Annual meeting of the joint consultative committees: Wandsworth Town Hall. 10.30 a.m. Principal speaker, Mr. Aidan Crawley.

November 29.—WALES AND MONMOUTHSHIRE JUNIORS, NORTH WESTERN SECTION: Y.M.C.A. Building, King's Avenue, Rhyl. 2.30 p.m. Paper, 'Pipe-line Butt-weld Inspection by Ultra-Sonic Methods,' by W. Lloyd Ellis.

November 30.—LONDON AND SOUTHERN JUNIORS: Caxton Hall, St. James's Park, London, S.W.1. Annual reception and dance. 6.45 p.m. (Informal dress).

November 30.—JUNIOR INSTITUTION OF ENGINEERS: 14, Rochester Row, Westminster, S.W.1. 7 p.m. Annual general meeting.

ENGLISH GAS FLOWS INTO SCOTLAND

History made at Border Meter-house

SCHEME FORESHADOWS WIDER DEVELOPMENTS SAYS N.G.B. CHAIRMAN

A TINY meter-house 20 yd. inside the Scottish border at Lamberton Toll, on the A1 road, was the scene of an event of some historic importance in the gas industry on November 14, when a valve was turned and English gas flowed through to Scottish consumers. It was only the second instance of one Area Board supplying another—there is a similar link-up between the North Thames and the Southern Boards—and it was the first time that a trans-border operation was involved.

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It was all a consequence of the Scottish Gas Board's policy of progressively closing small and uneconomic units and providing a bulk supply to the areas concerned from larger and more modern works. Special problems arose in the South-East Scotland coastal area since there was no manufacturing station of any size under the Scottish Gas Board that could provide an alternative supply for the little towns of Eyemouth and Ayton.

An approach was therefore made to the Northern Gas Board early last year for a bulk supply to be provided from the Berwick works. This had been made possible by the reconstruction of the Berwick works in 1952-53, when modern intermittent vertical retort plant was installed, fully capable of meeting the future requirements of Berwick and the neighbouring townships.

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As a first step in the development the works at Eyemouth and Ayton were linked by a 4-in. diameter main, and Ayton works ceased manufacture in January of this year. Meanwhile, other work was proceeding on both sides of the border. Boosting plant was installed at Berwick works, comprising a Holmes-Connersville electrically-driven booster with variable speed gearbox, and a similar machine for standby duties driven by a Ruston Hornsby diesel engine. Both machines have a maximum capacity of 5,000 cu.ft. per hour at 8 lb. pressure.

Approximately 8,550 yd. of 4-in. diameter main were laid between Berwick works and the Lamberton Toll meter-house—all of it, with the exception of about 440 yd. of steel main over the Royal Tweed Bridge, of cast iron, with mechanical joints. On the Scottish side, 13,300 yards of 4-in. diameter main were laid betwen Lamberton Toll and Eyemouth and Ayton. The two mains met in the little meter-house at Lamberton Toll, which contains a Peebles volumetric governor and a Kent inferential type meter. The final connection and the necessary testing were completed towards the end of September.

The official inauguration of the supply was performed by the Mayor of Berwick, Alderman Mrs. B. F. C. Adams, at the meter-house in the presence of representatives of both the Scottish and Northern Gas Boards. She was accompanied by Mr. Sidney Smith and Mr. E. Crowther, the respective Board Chairmen.

At a luncheon which followed in Berwick, Mr. Smith presided, and among the gas personnel present were: Mr. E. Crowther, Chairman, Northern Gas Board; Mr. J. E. White, Deputy Chairman, N.G.B.; Mr. J. F. Jackson, Secretary, N.G.B.; Mr. J. E. McManus, Divisional Manager, Blyth Division, N.G.B.; Mr. D. D. Burns, Deputy Chairman, Scottish Gas Board; Sir R. Nimmo, Chairman of the Scottish Gas Consultative Council and a Member of the Sc.G.B.; Mr. D. D. Melvin, Member of the Sc.G.B.; Mr. C. Murdoch, Member of the Sc.G.B.; Mr. A. T. Herd, Secretary, Sc.G.B.; and Mr. D. J. Colvin, Divisional Controller, South-East Scotland Division, Sc.G.B.

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Proposing the toast of 'The Guests,' Mr. Smith said that the occasion was unique, with something of an international flavour. They were seeing the culmination of a most co-operative effort between the Northern and the Scottish Gas Boards. 'This is only the second time that this has been done since the nationalisation of the gas undertakings in 1949. The only other link between two areas in Britain is that between the North Thames and the Southern Gas Boards.

'It has been part of the policy of the gas boards to close down small uneconomic undertakings after providing a bulk supply of gas from more efficiently-run works. The two works at Eyemouth and Ayton are a long distance away from any manufacturing station of any size in the Scottish Gas Board's area, and it seemed logical that the Scottish Gas Board—and this was before my time—should approach the Northern and discuss with them the possibilities of supplying a bulk supply from Berwick.

'With his usual helpfulness, Mr. Crowther agreed; things were put in motion, and we see the culmination of these efforts to-day. I would like to pay tribute to those people who have been responsible for the practicalities of the job—Mr. McManus, Blyth; Mr. Keillor, Berwick; Mr. Colvin, Scottish Gas Board; and Mr. Jones, Eyemouth. We had some serious difficulties, particularly because of bad weather. In the winter the route of the main was covered by 9 in. of snow, and then in August we had very serious floods. But in spite of it all the work has been successfully carried through.'

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Replying to the toast, Alderman Mrs. Adams said that they had inaugurated that day something 'rather wonderful.' As she turned that valve in the meter-house she could not help but reflect what a great feat—engineering and economic—it was that from what was nearly a derelict works at Spittal they had erected since vesting day new works from which they were going to be able to supply their neighbours.

'If only other organisations would do this united planning that we have seen to-day, forgetting that there are such things as boundaries, there is no saying how far we might go, instead of working in watertight compartments and showing such a foolish jealousy one with another that never gets us anywhere. I hope that this is the start of what we will see in other directions.'

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Mr. E. Crowther, proposing the toast of 'The Scottish Consumers,' said that when reconstruction was carried out at Berwick—it was completed about three and a half years ago—care was taken to make provision for extensions in the future, and room was left, if ever the occasion should arise, to build more plant. The Northern Gas Board was

With the Mayor of Berwick, Alderman Mrs. B. F. C. Adams, are (left to right) Provost J. S. Collin, of Eyemouth; Mr. Sidney Smith, Chairman, Scottish Gas Board; Mr. E. Crowther, C.B.E., Chairman, Northern Gas Board; and Mr. F. B. Keillor, of Berwick.

glad to be in a position to assist their Scottish neighbours.

'I do feel that it does show that amid all our preoccupations the gas boards are not unable to appreciate the occasion when their attention should be directed to affairs beyond their own immediate boundaries. In itself the project is small in size, but I think you will regard it, as I do, as a portent of wider developments in the future. The precedent has been created.'

The sheer geography of the territory controlled had made the Scottish Gas Board's task a tremendous one, he continued, but on the evidence it was being tackled with no small degree of success. 'To some extent this link is going to remove one small active preoccupation from your minds, and, to the extent that you can devote your attention to the remainder of your territory, must constitute a definite advantage to the whole of the Scottish gas consumers.'

Sir Robert Nimmo, replying, said that he had heard complaints at Scottish Consultative Council meetings of the necessity to import coal from England. 'It has been pointed out that these imports of coal from England raise the average price of gas in Scotland by a ¼d. per therm. If, instead of coal, we can import gas from England, it might be a benefit to Scotland. There might be a further extension of what has been done to-day.'

The closing of the Eyemouth works brings the number of small and uneconomic undertakings closed by the Scottish Gas Board since nationalisation to 49, or a quarter of the total number of works taken over on vesting day. Plans are at present in hand for the closing of a further 17 small works after their areas have been provided with a bulk supply.

Council Has Second Thoughts on All-Electric Houses

IRVINE (Ayrshire) Corporation Housing Committee are having second thoughts on their recommendation that 86 new houses should be all-electric. At a meeting of the full Town Council, it was agreed, following Scottish Gas Board representations, to send the matter back to the Committee.

At their last meeting the Committee noted that the total cost of electricity and gas services was £50 16s. per house; that if electricity was provided for cooking and lighting the total cost would be £41 0s. 9d.; and that if freedom of choice was left to the tenant, the total cost could be £54. By one vote it was agreed that electricity should be provided for both cooking and lighting.

Letter Submitted

At a Finance Committee meeting a letter was submitted from the District Manager, Scottish Gas Board, stating that the method adopted by the South of Scotland Electricity Board for assessing their charge for the provision of a service left little possibility to the Gas Board of making a competitive offer, and asking the Committee to install both a gas and an electricity service for cooking, leaving the tenant to choose and provide his own appliance.

In these circumstances, said the letter, the Board would install a service for a contribution from the Council of £5 per house, which would have the advantage of saving the Council some £22 per house. As the majority of new tenants were being rehoused, most of them would already possess a cooker, and facilities for the easy acquisition of gas and electric cookers were available to those who had not. The cost of a cooker to the tenant was likely to be considerably less than the cost plus interest paid by the Council.

As a result of this letter the Town Council decided unanimously that the Housing Committee should 'have another look at this matter in relation to gas v. electricity.'

Reorganisation is a Success

REORGANISATION of the Weston-super-Mare/Taunton Division of the South Western Gas Board into three, instead of six, districts is 'administratively an improvement,' says the Board's Divisional Engineer and Manager, Mr. J. D. Butler.

Mr. Butler, who was speaking at a meeting of the local committee of the South Western Gas Consultative Council, added in reply to a question by Sir Colin Campbell, O.B.E, Chairman of the Council, that he had no knowledge of prejudice on the part of consumers resulting from the changes.

Manchester Juniors Visit Cadbury Biscuit Factory

HIGHLIGHT of this month's meeting of the Manchester District Juniors Association of Gas Engineers was a visit to the chocolate biscuit factory of Cadbury Bros. at Moreton.

They saw the modern, efficient processes of manufacturing 300 tons of biscuits weekly, in which 1¼ mill. cu.ft. of gas is used; and they were impressed by the happy way in which the 1,200 employees tackled the job of preparing the materials of which more than 400,000 biscuits of different varieties are produced every hour.

One of the many out-factories of Bourneville, Moreton was started less than three years ago, and already the daily flow of biscuits has passed the initial total expected. Social schemes available at Bourneville are open to Moreton employees whose health is protected by airy, well-lit workrooms, carefully planned duty rotas, and ample facilities for outdoor sport. The 73-acre site will allow for expansion expected to become necessary in the near future.

Mr. J. K. Lord, Senior Vice-President, thanked Cadbury Bros. for facilitating the interesting tour and providing light refreshments. He apologised for the absence of Mr. T. Nicklin, President, and Mr. H. Parkington, immediate past President.

The visitors afterwards adjourned to the High Street, Birkenhead, undertaking where they were the guests of the Wirral Group at high tea, and heard Mr. H. C. Elles, Group Industrial Gas Engineer, read a paper on 'Industrial Gas in Wirral.'

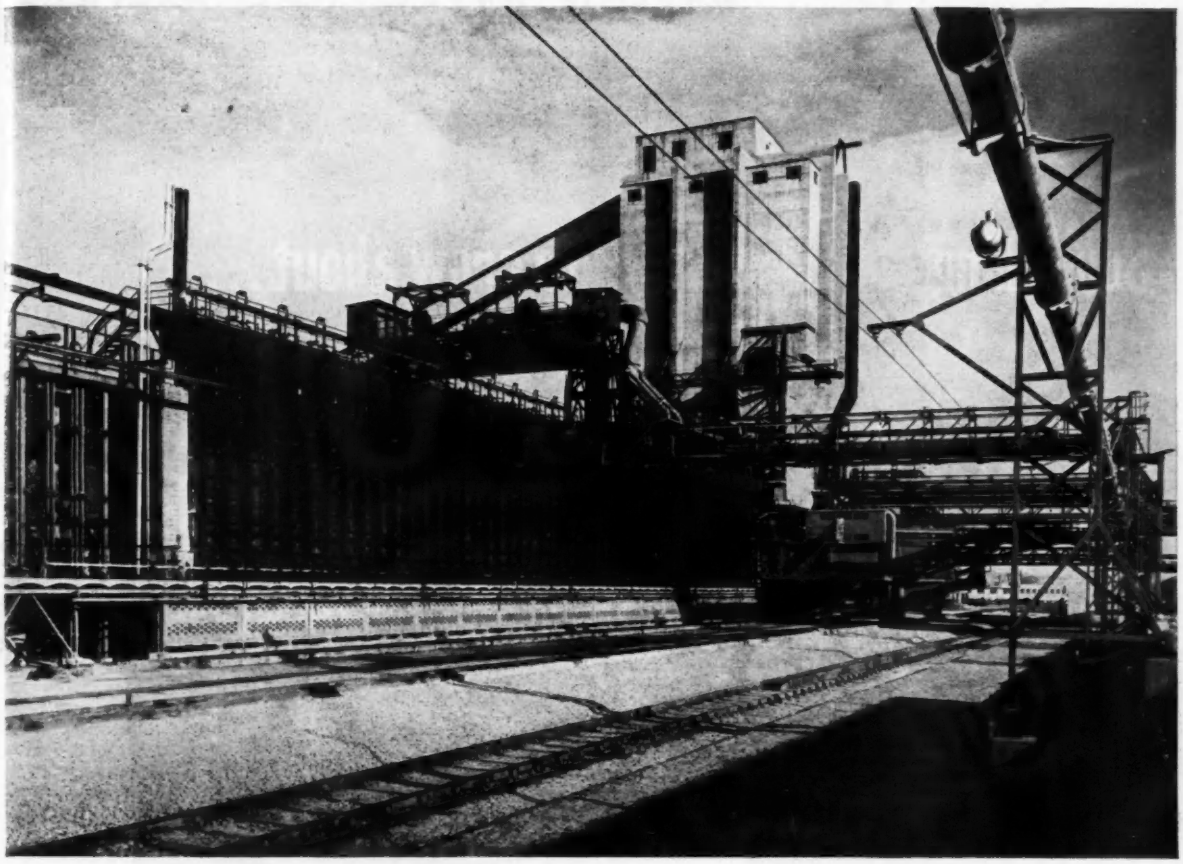
USE OVEN HEAT TO DRY TEA CLOTHS? NO! SAYS W.G.F.

WOULD it be a good idea for gas cookers to be fitted so that tea cloths could be dried by heat from the oven? The Women's Gas Federation thinks not. The 12th Branch Conference in London last week—at which 108 of the 130 branches were represented—threw out a proposal by Walthamstow and Leyton branch suggesting this.

After a talk on 'Home Safety' by Mrs. Patricia McLaughlin, M.P., Mrs. G. Abbott, Federation Chairman, moved a resolution calling for more information on the relative flammability of different fabrics and proposing that non-inflammable materials or garments offered for sale should be marked accordingly. This resolution was carried unanimously.

It was also decided to set up an ad hoc committee to investigate the desirability of amending the constitution of the Federation to provide regional representation on the executive committee. A resolution to this effect had been moved by Liverpool and seconded by Prescot.

After Dame Vera Laughton Matthews had explained that uniform appliance prices had been agreed among the 12 boards and that standardisation of fixing charges was under discussion, West Ham withdrew a resolution on these costs.



The Pusher Side of the North Battery after six months operation

The Avenue Carbonisation and Chemical Plant of the National Coal Board, East Midlands Division

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Something to crow about...

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NEW

BEGWACO

BANTAM

150 CU. FT. GAS METER

COOKER AND WATER HEATER SALES STILL SHOW DECLINE

Industry buys more gas but total sold falls

THE decline in appliance sales continued during the quarter April-June, 1956, gas industry statistics show. Hire-purchase sales were particularly affected. The percentage fall was not, however, as great as in previous quarters, in comparison with the year before. Cooker sales fell by 17% and water heater sales by 14%.

Industrial gas sales during the quarter showed a further increase of 2%, but as there was a decrease of 2% in domestic sales and of 1% in commercial and other sales, there was a fall of 1% in total sales compared with the corresponding period of the previous year.

To release more coke for sale, there was an increase in the production of coal gas and a reduction of 26% in the production of water gas, compared with the April-June quarter of 1955. Purchases of gas from coke ovens and oil refineries increased by almost 16%, the total gas made and purchased being not quite 1% under the total for April-June, 1955. There was little change in the amount of coal carbonised, but oil for water gas production was reduced by 29%.

The average realised value per therm of gas sold for the three months was 18.7d. compared with 16.8d. per therm for the period April-June, 1955.

Gas Production

Production of coal gas in the first quarter, 1956-57, rose by ½%, whereas the quantity of coal carbonised was practically unchanged. Water gas production, however, decreased by over 26%. Coke used for making water gas fell by approximately 26%, while gas and heavy oil used for the same purpose fell by almost 29%. The output of gas made in oil gasification plants increased by over 42% in April-June, 1956, compared with April-June, 1955. In the same periods, the consumption of heavy oil in oil gasification plants was 1.1 mill. gal. and 0.7 mill. gal., respectively.

Total gas made in the three months ended June, 1956, was lower by 3%. The quantity of gas purchased from coke ovens and oil refineries increased by almost 16%. As a result, there was approximately a 1% decrease in the total of gas made and purchased.

By-Products

Coke production decreased by over 1%, but the quantity of coke sold was 12% less than in the corresponding three months of last year. Coke breeze made fell by 4%, but crude tar production rose by almost 1% and crude benzole produced was up by over 12%.

Cash and hire-purchase sales of cookers fell by approximately 25,000 (or 17%), while sales of gas fires fell 25%. Sales of wash boilers, with a 4% decrease, were not so greatly affected as the sales of other appliances. On the other hand, sales of washing machines showed a decline of over 32%. Refrigerator sales were 21% down.

Capital Works

New gasmaking capacity brought into use amounted to 24 mill. cu.ft. against 22 mill. cu.ft. in the first quarter of 1955-56. Of this 24 mill. cu.ft., new carbonising plant accounted for 20 mill. cu.ft.

The net increase in the mileage of mains laid in April-June, 1956, was 594 miles, which is 9% less than the length of new mains laid (692 miles) in April-June, 1955.

Employment

The total number of employees at the end of August, 1956, was a little more than 138,000, which is 3,000 less than the number employed at the end of August, 1955.

S.E.G.C.C. Meeting

Decision to question the Board on its trading policy on the purchase and resale of gas cookers, and on the price of cookers was taken at a meeting of the South Eastern Gas Consultative Council last week. Industrial tariffs and unguarded gas fires in private houses were also discussed.

COUPLE SHOOT THEIR WAY TO VICTORY

HELD at London Transport's rifle range in Baker Street, the annual small-bore rifle shoot of the North Thames Gas Sports Association resulted in keen competition among members of clubs throughout the Board's area.

Five contests were staged, and almost sweeping the board were Mr. and Mrs. L. H. W. Ford, of Southall, who, between them, won four of the five competitions. Neither of them had a lower score than 98, and each won a competition with a maximum score of 100. Mr. Ford is an assistant foreman with the Board at Southall works.

Prizes were presented by the Chairman of the rifle section, Mr. W. C. Laws, who is Mechanical Engineer at Nine Elms works.

E.M.G.B. Gives Assurance on Supplies

SHEFFIELD AND ROTHERHAM AREA

UNLESS anything unforeseen happens to existing plant, or in the commissioning of new plant nearing completion, adequate supplies of gas should be available in the Sheffield and Rotherham area, the East Midlands Gas Consultative Council were informed at Nottingham on November 6. Cuts last winter raised a storm of protest and inquiry.

A letter from the Board stated that since last winter, the full installation of the Car House works, Rotherham, had come into operation with a capacity of 8 mill. to 10 mill. cu.ft. per day; the first section of the new carbonising plant at the Neepsend works, Sheffield, was scheduled to begin gas manufacture early in January, producing 2 mill. cu.ft. per day, rising to 3 mill.; the new Manvers coke oven plant of the National Coal Board would come into operation in sections during November and January, in total amounting to about 13 mill. cu.ft. per day; and two additional holders, Meadow Hall, 8 mill. cu.ft., and Neepsend, 5 mill. cu.ft., would be operating this winter.

NEARLY 100 GUESTS ATTEND REUNION

ALMOST a hundred guests were present at the annual reunion given by the Nine Elms Sports and Welfare Club for pensioners of the North Thames Gas Board formerly employed at the Nine Elms works.

Ten of the pensioner guests were over 80 years of age, the 'top scorer" being Mr. C. J. Milsom, who has reached the age of 92.

During the roast turkey dinner, Mr. E. J. Edwards, President of the Club and Station Engineer at Nine Elms, spoke, welcoming the guests. This was replied to, on behalf of the pensioners, by Mr. J. Williams.

Gas Appliances on TV

Gas appliances had a good showing in 'Look and Choose,' the B.B.C. television women's programme, recently. Expert advice was given by Mr. E. W. B. Dunning, of Watson House. The programme was introduced by Lady Barnett, and others taking part included Miss Christine Begris, of Queen Elizabeth's College, and Mrs. Ann Jones, a housewife.

MR. THERM TAKES HIS PLACE IN SCOTS EXHIBITION

Gas Board Stand at Modern Homes Display, Glasgow

A wide array of gas appliances was seen on the Scottish Gas Board Stand at the recent Modern Homes Exhibition in Glasgow of which our picture shows two aspects. Gas cookers, water heaters, refrigerators, fires, washing machines, and boilers were all there to tempt the housewife with their labour saving efficiency and attractive appearance.

N.W.G.B. Concerned at Drop in Domestic Consumption

MR. S. G. DEAVIN, North Western Gas Board, Secretary; Mr. R. Kerr, Chief Accountant; and Mr. F. Litler, Chief Technical Officer, attended this month's Area Consultative Council meeting in Lancaster to speak on the Board's annual report and accounts for 1955-56 and answer questions arising from it.

Alderman J. Miller, Barrow-in-Furness, Council Chairman, who presided, was accompanied by Deputy Chairman Alderman W. H. Stables, J.P., and Mr. H. A. Robinson, Northern Group Manager.

Mr. Deavin said the Board and Council were deeply concerned over the fall in domestic gas consumption, but referred optimistically to the development of solid smokeless fuel. He mentioned particularly briquettes produced by the Thermalite process—perfected by North West technicians—which would have quick ignitability, would burn steadily, give a tremendous heat, bring about a clean atmosphere, and perform an extremely important function in relation to the Clean Air Act.

It would be on the market, he said, this winter and would replace coal in the old open oven grate in one grade, while another type was designed for the closed stove.

Alderman Stables, who represents Kendal, appealed to the Board and Consultative Council to be realistic in considering the decline in gas consumption for domestic purposes. Unless inducements were promoted for the domestic consumer the downward trend would continue, he said. Compared with electricity gas in the domestic field was likely to have a rough time. It seemed that at least 50% of domestic consumers were uneconomical to the Board, and something should be done to bring them to the stage where it would be worth holding them.

Mr. Deavin said as proportional tariffs were *sub judice* he could not discuss them. He thought the whole question of tariffs would have to be considered; they were designed to be an incentive to consumers to use more gas and must be on a sound basis.

Mr. Litler, replying to Alderman Stables' complaint about Kendal gasworks, said if they were to put up the c.v. at this works they would be obliged to enlarge the plant. They were building a new works at White Lund, but he did not know whether it would be economical to couple Kendal up with the grid mains which had reached as far south as Carnforth. Alderman Stables said he would raise the matter again in six months' time.

BATTLE OVER GAS PLANT SITE IS STILL UNDECIDED

THE first round in the battle between Warwickshire County Council and the West Midlands Gas Board about whether a £4.5 mill. gas plant should be built at Coleshill has virtually ended in a draw.

The Minister of Fuel and Power has decided, following a preliminary public enquiry at Coleshill, that about 16 acres of the land is 'operational' under the Town and Country Planning Act, 1947.

Commenting on the decision, a Meriden Rural Council official said on Tuesday: 'It means that about half the land in the original application is operational. This is the land acquired by Birmingham Corporation for a gasworks before the war. The remainder is not operational. The result, he added, left neither side with a clear advantage.

The next move is problematical. Each side has the right of appeal to the High Court. In any case, a second public enquiry will be held, at date to be fixed, when general issues will be raised.

These will include evidence of the effect of the plant on green belt amenities and the opinions of local people and organisations. Seven parish councils are among those supporting the County Council and the Rural Council who refused planning permission.

A MOST SUCCESSFUL EXHIBITION

S.E.G.B. Displays Brand New Ducting System

'ONE of the most successful stands we've had,' was the verdict of South Eastern Gas Board officials after the closing of the exhibition held at the National Housing and Town Planning Conference at Brighton from October 24-26. Chairmen and members of local housing committees as well as local government housing officials from all parts of the country attended.

On the Board's stand, which occupied an island site opposite the main doors leading to the conference hall, space heading and water heating were the principal themes, and the main focal point of interest was a brand new and unique system of ducting for use with balanced flue gas appliances. This is the 'Se-Duct' which has been developed in the Board's Central Laboratory at Old Kent Road.

In the 'Se-Duct' system balanced-flue gas appliances are fitted to a vertical duct, open at the top and at the bottom. This duct serves both to supply the air for combustion and to carry away products of combustion.

General view of the S.E.G.B. stand showing a full-size example of 'Se-Duct' at ground and first floor levels.

The warmth from these products causes a flow of air which enables many appliances on different floors to be fitted to one duct and yet the concentration of products, even at the top, is not enough to affect their performance. As a result, it will be possible to fit highly efficient balanced-flue appliances on inside walls instead of only on exterior walls as at present.

'Aladdin's Lamp' scheme meets with success

FIRM OFFERS NEW MODELS FOR OLD

THOUGH little more than six months old, the Jubilee Year scheme launched by George Ellison, Ltd., in an attempt to obtain very old examples of their switchgear for a museum, has so far been extremely successful. This firm from Perry Barr, Birmingham, are interested in obtaining one good specimen of each type of Ellison gear supplied in the early years of their existence and are prepared to give modern gear in free exchange for the models they require.

Since the scheme was launched in mid-April, it has attracted the interest of many users who have old Ellison gear still in service, and several early examples have been brought to light, mainly in the North of England. In a Huddersfield brewery, for instance, early Ellison air-circuit breakers have been controlling pump motors since 1913.

In the same year an Ellison rotor starter was installed in a Manchester rubber factory and is still in service today controlling a 32 H.P. motor. Further, in a London factory there are three Ellison control panels that have continued to give trouble-free service since 1910.

The oldest of all the vintage Ellison gear discovered, however, is a Star-delta starter that has been controlling a 10 H.P. motor in the textile factory of George Beaumont, Ltd., of Huddersfield, for 47 years.

The Ellison Company are hoping that many more users will come forward with news of old Ellison switchgear that is at least 40 years old and still in use today, and readers interested in the 'new-models-for-old' scheme are invited to communicate with Ellison branch offices in London, Birmingham, Cardiff, Glasgow, Leeds, Manchester, or Newcastle-on-Tyne.

Irish Consumers Face Further Price Increases

COLERAINE (Co. Down) Borough Council has decided to hold a special meeting to consider the auditor's report on the trading accounts of the gas department for the financial year 1955-56 and also the probable increase in the price of gas.

The Gas Manager, Mr. T. Cameron, recommended that the prices of coke and breeze be increased by 15s. per ton; that the price of tar, in small lots, be increased by 3d. per gal., and by 2d. per gal. for 40-gal. drums; and that all gas appliances be sold in future at the makers' list price.

Mr. Cameron said the amount of gas manufactured between September 25 and October 26 was 14,402,400 cu.ft., a decrease of 2,129,400 cu.ft. compared with the corresponding period last year.

The Council decided to make the Gas Manager an allowance of £100 per annum in respect of the use of his car on Council business.

Meanwhile, Newry (Co. Londonderry) Urban Council Gas Committee has decided to increase the price of gas by 6d. per 1,000 cu.ft. Pensioners of the undertaking have been granted a 10% increase in their pensions.

Price Rise in Eire

The Eire Prices Advisory Body has recommended an increase of 10d. per 1,000 cu. ft. in the price of gas in Drogheda, C. Louth. The recommendation has been accepted by the Minister for Industry and Commerce.

THE MINISTER AND THE GOLD MEDALLISTS

The Minister of Fuel and Power, Mr. Aubrey Jones, M.P., with members of the gas industry after he had presented them with the British Empire Medal on November 9. Left to right are Mr. G. H. Cooper, Mr. E. Lee, Mr. R. Peart, Mr. S. B. Woodhouse, Mr. Jones, Mr. R. Twells, Mr. J. Hancock, and Mr. C. H. Law.

YORKSHIRE JUNIORS HOLD ANNUAL MEETING AT LEEDS

MR. G. E. Banks, President, handed over the chain of office to Mr. R. H. Anderson at the annual general meeting of the Yorkshire Junior Gas Association at Leeds on November 3.

Earlier Mr. Banks had invited Mr. L. Hartley to present the Clayton Gold Medal to Mr. W. I. Ineson for his paper 'Coke—The Smokeless Fuel,' and Mr. T. A. Clapham to present the Clapham Silver Medal to F. J. Painter for his paper 'Works Efficiency.' The Firth prize was awarded to Mr. D. Craven for his paper, 'Pipe Bridges.'

As the result of the ballot Messrs. E. C. Burkett (York), R. C. Croasdale (Rotherham), C. A. Roberts (Wakefield), and J. Edgar (Todmorden) were elected to the Council. Messrs. J. E. Brandon (Sheffield), J. G. Gaunt (Spenborough), and R. E. White (Tingley), were elected to the Yorkshire District Gas Education Committee; and J. G. Gaunt and R. E. White to the Yorkshire Council for Further Education.

The address was given by Mr. G. E. Currier, O.B.E., Deputy Chairman, North Eastern Gas Board.

COMPANY NOTES

Simon-Carves Ltd.

The Directors of Simon-Carves, Ltd., have declared an interim dividend of 7½%, but warn that this does not necessarily mean that total distribution for 1956 will be greater than for 1955—equivalent to 16⅔% on present capital.

Thomas De La Rue & Co.

The Directors of Thomas De La Rue & Co., Ltd., have declared an interim dividend of 10% (actual), less tax, on ordinary stock for the year ending March 30, 1957.

NEWS IN BRIEF

£2 mill. factory extensions planned

THE British Tyre & Rubber Co., Ltd., plans to expand operations at Leyland, Lancashire, and has purchased a neighbouring site of 32 acres at Farington. The Company has received Board of Trade approval to erect manufacturing buildings in the area and permission to develop the Farington site has been granted by the Preston R.D.C. and the Lancashire County Council.

Expanded manufacturing facilities for a number of the Company's specialised industrial rubber products will be installed on this new site, and these plants are expected to be operating early in 1958. The cost of the first stage of this new factory development will be about £2 mill.

Series of Lectures

A series of ten lectures entitled 'Atmospheric Pollution and Current Problems in the More Efficient Use of Fuel' is to be given on Monday evenings, commencing January 28 next, at the Northampton Polytechnic, St. John Street, London, E.C.1.

New W.G.F. Branch

A Reading and District branch of the Women's Gas Federation was inaugurated last week. The Mayoress of Reading, Mrs. A. Lockwood, is the first President, and Mrs. Olive Stay the Chairman.

Railways Exhibition

An exhibition of special interest to all sections of the British Transport Commission is being held at the Showrooms of Allied Ironfounders Ltd., 28, Brook Street, W.1, from December 5-14. The exhibition will be open daily, except Saturdays from 9.30 a.m. to 5.30 p.m.

Mrs. Cleo Maletis, 31-year-old mother of three boys and winner of this year's 'Mrs. America' competition, sponsored by the American gas utilities, invites her husband to taste the soup she made on a British gas stove at the home of Mrs. Gwen Evershed, President of the Wanstead and Woodford branch of the W.G.F., during a recent visit to Britain.

New Address

The Glasgow office of Calor Gas (Scotland) Ltd., and Calor Gas Ireland Ltd., is now 11-15, Westwood Road, Pollokshaws, Glasgow, S.3. Telephones: Langside 9141-2-3.

Ideal Home Exhibition

The Daily Mail Ideal Home Exhibition of 1957 will be held at Olympia from March 5 to March 30.

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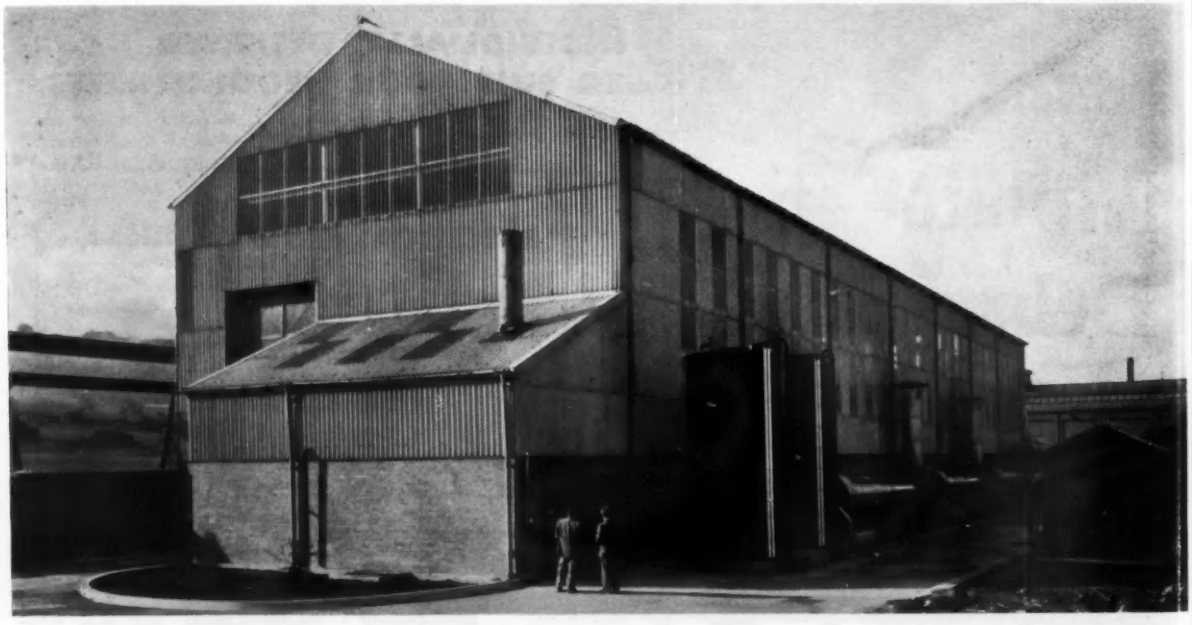

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Appliance Sales Offset Drop in Demand for Meters

GEORGE WILSON GAS METERS LTD.

ALTHOUGH the demand for meters by the gas industry dropped, the sale of gas appliances increased the profits of George Wilson Gas Meters Ltd., of Coventry, last year. The group's consolidated net profit rose from £18,859 to £22,067, the annual report for the year ended March 31, 1956, reveals.

Results so far as the parent company were concerned were 'rather disappointing' because of increases in the cost of labour, material, and other trading expenses which were absorbed 'without adequate increases in selling prices,' says the chairman, Mr. W. D. Wilson, in his review.

He added 'Your directors are able to report that the manufacture of appliances, which is being undertaken on an ever increasing scale by the parent company, is producing satisfactory financial results which are going far to alleviate the severe recession in meter purchasing by the nationalised gas industry.

'Expansion,' he goes on, 'is bound to be made more difficult by the credit squeeze and by the continued and regretable tendency for costs to increase as the result of continued wage demands.

The board is again recommending a dividend of 15%, less tax, on the ordinary share capital.

Interim dividends already paid are 3% on fixed cumulative preference shares absorbing £5,105 (against £3,900) and 4% on ordinary shares £23,403 (£20,800).

Final dividends recommended are 3% on preference absorbing £7,359 (£3,900) and 4% on ordinary, £27,768 (£20,800).

Carry forward is £14,800 against £12,231 brought forward in 1955.

SUGG PROFITS DIP £50,000

Distribution is 5% Less

GROUP profit of William Sugg & Co., Ltd., was £14,830, against £64,989 last time, the report for the year ended June 30, 1956, shows.

Final dividend of 10%, less tax, is recommended, making 15% for the year, against 20%. The dividend recommended requires £13,327 net, against £19,989.

Taxation absorbs £24,300 (£52,713), while £38,102 is carried forward against £43,262 brought forward in 1955.

POWER-GAS OFFER

Acceptances totalling over 97% of the offer by the Power-Gas Corporation Ltd., of 800,000 Ordinary shares of 10s. each at 25s. per share were received from shareholders, the company announce. Applications for additional shares were over 14 times the number available. Applications for up to 33 additional shares have been allotted in full and larger applications have been allotted 33 shares each.

Australian Gas Sales Increase

TOTAL sales of gas by Colonial Gas Holdings, Ltd., Victoria, Australia, increased by 6.2%, compared with 1955, the annual report shows. Since the close of the year the sale of the Colonial Gas Association's assets in the Dandenong and Frankston areas to the Gas and Fuel Corporation of Victoria has been announced. The sale is of mutual benefit to both companies. Chemical and by-product undertakings also had a satisfactory year.

Net profit of the Company and its subsidiaries for the year ended June 30, 1956, was £175,340. Interim dividends of 3% on Preferred stock and 3¼% on Ordinary shares and stock on the amount paid up amounted to £78,874; while final dividends were recommended of 3% on the 6% Cumulative Preferred stock making 6% for the year, £24,000; and 4% on Ordinary stock, £60,000.

Carry forward is £26,861 against £14,395 last time.

APPLIANCE SALES ARE A RECORD

Gas Supply Co. Ltd. of Melbourne

BRANCHES of the Gas Supply Co., Ltd., of Melbourne, Australia, existing at the beginning of the year made good progress, and three important Branches were added—Bundaberg in Queensland, Broken Hill in New South Wales, and Ballarat in Victoria—states the Chairman, Mr. R. A. Schuchard.

The volume of gas sales increased by 5½% over those of the preceding year. This caused corresponding increases in sales of coke and tar. The sales of appliances again reached record figures, both in number and value, which augurs well for future increases in gas sales.

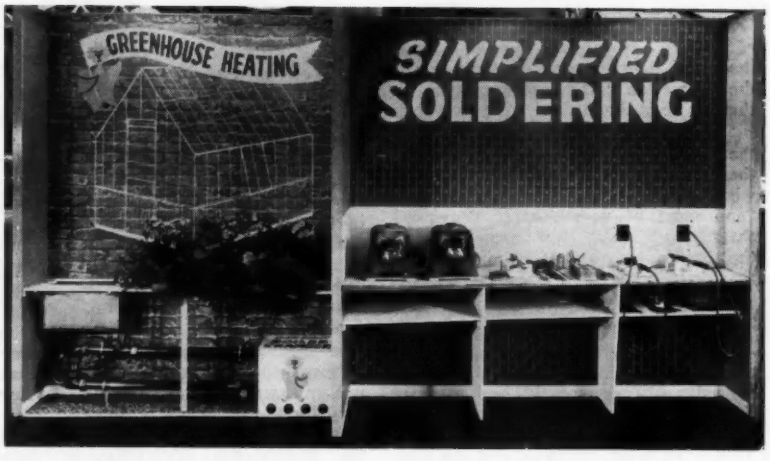
Profit of £86,204, against £63,028 last time, is shown in the report for the year ended June 30, 1956.

SOUTH AUSTRALIAN

THE Directors' report of the South Australian Gas Company, for the year ended June 30, 1956, shows that the net profit was £54,266. As the form of accounts has been altered this year, however, the Directors point out that it is not possible to make accurate comparisons with the previous year.

The dividend (3% interim, 3% final) amounted to £29,292 which, taking into account income tax over-provided in the previous year, meant a balance transferred of £34,340. With undistributed profit from previous years, this left £92,840 for the profit and loss appropriation account.

MR. THERM AIDS HOBBIES



A very successful 'Hobbies Exhibition' was recently held in Edinburgh under the auspices of the Edinburgh Rotary Club. The Scottish Gas Board stand was devoted primarily to the hobbies of gardening, cooking, and metal working, featuring the uses of gas in these hobbies. Pictured above is a section of the stand.

THOSE COMMITTEE REPORTS: HOW TO CUT WASTAGE

Business Chiefs Thrash Out Their Problems

MORE than 600 'business chiefs and top managers' attending the British Institute of Management's national conference at Harrogate earlier this month were given a wide choice of debating points under the general title of 'Management—profits—living standards.' Transport and communication problems, the cost of labour turnover, methods of reading up to 1,000 words a minute and ways of recruitment to the boardroom were among the many subjects chosen by distinguished speakers.

In a paper on effective communication in industry, Mr. R. H. Coates, Southern Division Controller of the Central Electricity Authority, outlined a time-saving method of dealing with committee reports.

'Official Reader'

He said that after the initial stages of nationalisation it seemed that if nine persons—himself and eight heads of departments—were all reading the minutes of the 53 important national committees set up much time and effort would be wasted.

So each man took six committees and was charged with the duty of acting as 'official reader.' He read his six sets of minutes not only for himself but for the other eight persons, marking out to the others the particular paragraphs he thought they should see.

'This official reading has cut down the amount of paper that we read on these minutes to less than a quarter of what it was before,' said Mr. Coates, 'and most of us are quite convinced that, as a group, our appreciation of the situation as a whole is much greater than it used to be.'

Time Limit

On the control of committees, he said all committees in his Division were reviewed every six months and a chart drawn up listing the committee's composition, how often it had met, the total amount of paper produced and the time taken. There was a divisional rule that no one was allowed to spend more than 10% of his time attending committees.

Said Mr. Coates: 'It appears to be the general opinion in industry that taking committees as they exist the optimum is to spend about a quarter of your time on them: If we limit our staff to spending 10% of their time on the committees that we ourselves are responsible for having set up, then we know that we are not likely to be erring above, say, 20%.

Dealing with the need for proper rules of procedure at committees, Mr. Coates said he was convinced that management's greatest contribution to improved communications was its power to impose the precision, to reduce the 'manufacturing tolerance,' and to help everyone to be more disciplined.

The simple rule that no paper of greater length than one page of foolscap was permitted at any committee unless circulated seven days before the meeting was an old dodge. But where was it insisted upon? How often did minutes turn up sometimes months after a meeting? How many committees picked up an idea, discussed it for a few meetings, then let it peter out, picked it up again a year after, and so on?

Keeping it Short

Mr. Coates said there was a rigid rule in his Division that new committee material was limited to foolscap length. Minutes were issued on average six days after a meeting and all outstanding matters appeared, by order, on the agenda with the date when the committee first discussed them.

'I think that anybody who spends an appreciable amount of time on committees will agree that for the committees to be more efficient and to spend less time uselessly the discipline of everybody concerned needs improving, and that training of the different people in becoming competent in these matters is worth while,' Mr. Coates stated.

Disclosing Finances

Some of the first results of a survey into the disclosure of financial information to employees—were given by Mr. H. Weston Howard, C.B.E, chairman of Hayward-Tyler and Co., Ltd.; full details are shortly to be published by the British Institute of Management as a book.

The investigation was made under the guidance of a steering committee consisting of representatives of the Association of Certified and Corporate Accountants the B.I.M., the Institute of Cost and Works Accountants, the Institute of Personnel Management and the Stamp Martin Chair of Accountancy.

Mr. Howard said the objects of the investigation were to present information to management under three heads. One was an examination of the methods being used for the disclosure of financial information; the second was an assessment of the effectiveness and value of these methods; and a third was the clarification of opinion among managements and employees as to the purpose of giving this information and so to consider what sort of information it was practicable and desirable to give.

Discussing this, Mr. Howard said: 'I believe that to give financial information is quite useless in itself; it can be done successfully only after a long period of team and morale building, and after a spirit of co-operation and trust has been built up between management and workers.

'To get the best out of workers these days can be accomplished only by treating them as fellow-workers in a common cause. It is an essential of good management that the objects to be achieved and the progress being made are fully known by all. The giving of financial information is only one of the many items in such a programme.

One conclusion drawn by the investigators was that senior staff at the firms where surveys were held did not, on the whole, appear to have an outstandingly better grasp of company affairs than the average employee. Describing this as 'very startling,' Mr. Howard agreed, nonetheless, that it confirmed his experience at the Administrative Staff College, Henley, where 'few of the members there have any idea of how to read a balance-sheet or of the use of figures in any way. . .'

Delegates to the Harrogate conference were surprised to hear from Mr. R. L. Webster, Chief Personnel Officer of Hoover Ltd., that the rate at which people were currently changing their jobs was costing the manufacturing industry £230 mill. a year. If all employed persons were included, Mr. Webster stated, the cost to the country as a whole was perhaps £700 mill.

Mr. Webster, who posed the question, 'How much does labour turnover cost the industry?' was presenting the first results of a special investigation into labour turnover costs.

The survey, soon to be published in booklet form, was carried out among 16 firms. It revealed that it cost each company anything from £5 to £396 every time an employee had to be replaced. Said Mr. Webster: 'Looking at the cost per employee we find that labour turnover adds from 5d. per week to £3 per week to the wage cost of each individual. In this series of 16 studies seven firms were adding 10s. or more per week to the wage cost per individual as a result of labour turnover.'

Dr. G. E. Foxwell will present a summary of the London Conference of last May on domestic heating in Cardiff on December 7, and not in Newcastle on December 3, as stated on p. 419 of our last week's issue.

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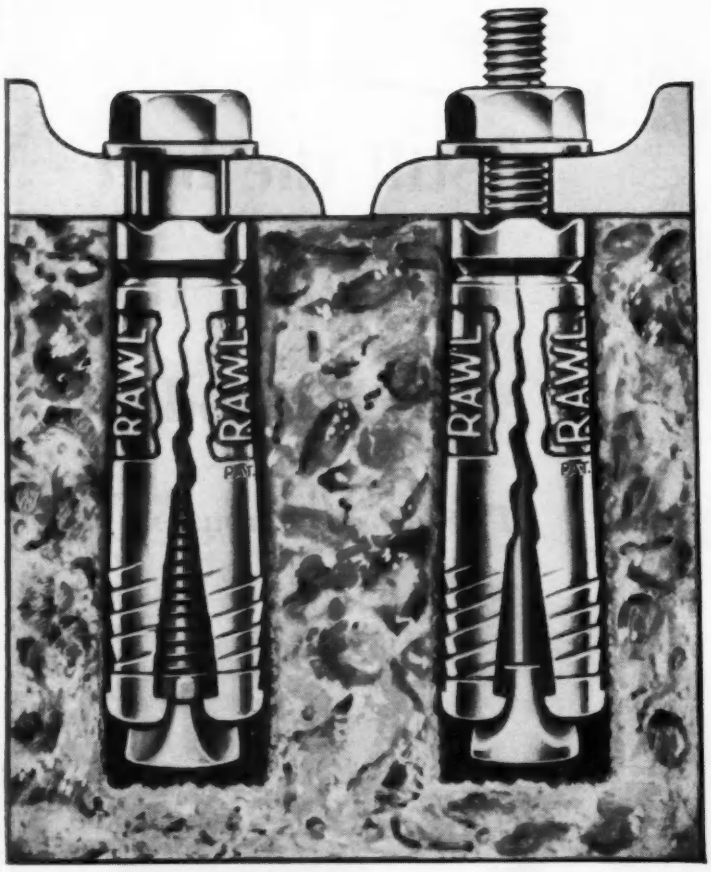

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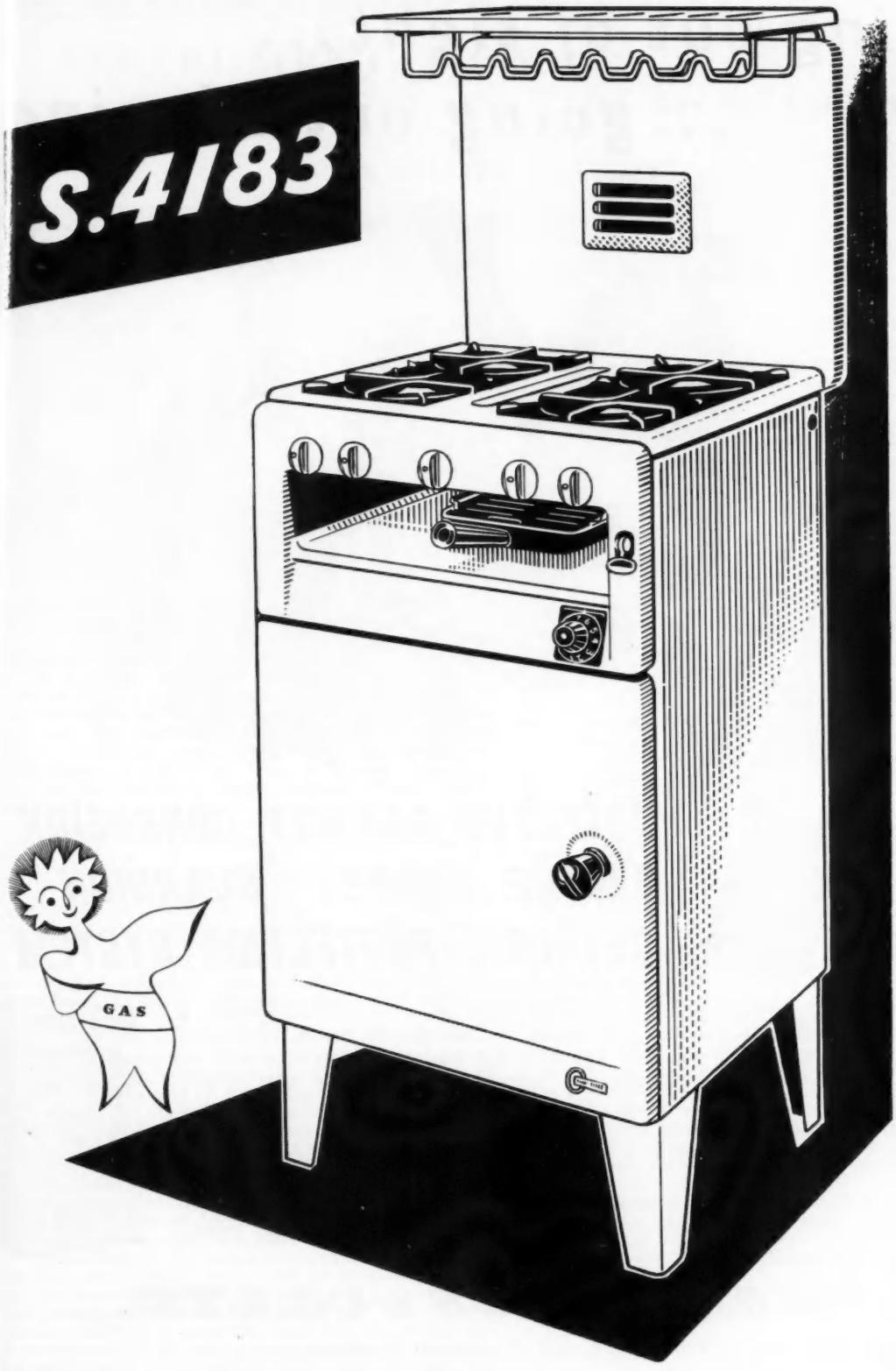

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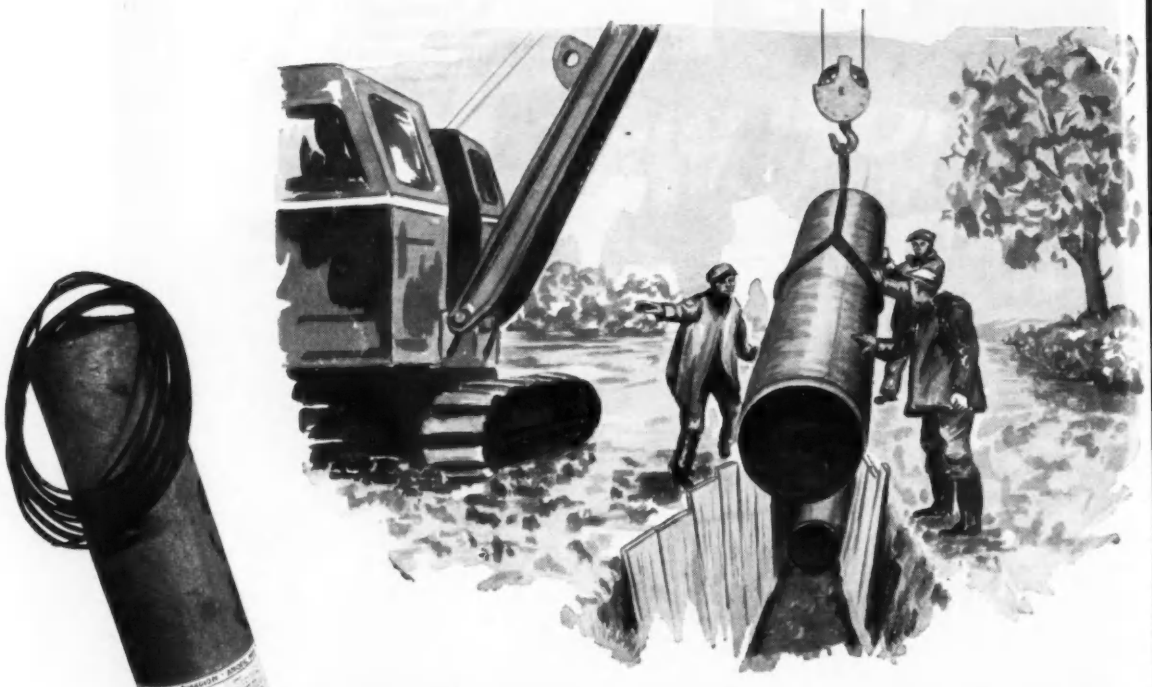

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From a Paper to the London and Southern Junior Gas Association, November 6.

INSTRUMENTATION —the Key to Automation

By WALTER J. TUCKER

and JOHN H. WHITAKER,

Elliott Brothers (London) Ltd. and Panellit Ltd., respectively.

SINCE its earliest days, the gas industry has been foremost in recognising the need to measure. It would not have been possible to develop the industry as we know it today, had this need for accurate and precise measurement not been recognised by all sections of the industry.

At first, the measurements which were quite uncomplicated, were made on site, and such variables as gas pressure, temperature, rate of flow and tank level were both indicated and recorded on orthodox instruments. But as the industry developed and as automatic mechanical processes were introduced, so it became necessary for more rigid measurements to be made and for changes in the measured values to be related to one another. Even now the gas plant engineer might well consider his plant to be adequately instrumented, if he uses the conventional instrumentation systems, and if that plant is of the gas from coal type, but with the rapid development of plants for making gas from various oils and the close resemblance between these cyclic plants and modern oil refinery installations, there is now a far greater demand for the application of modern instrument techniques.

In the modern refinery, many changes have taken place in instrumentation, so that the designers of such plants realise that with the minimum number of operators in mind, the amount of display instrumentation should also be reduced. Consequently, in the oil and chemical industries, there is a great demand for the adaptation of modern data reduction techniques.

These techniques are equally applicable to the oil/gas installations which are now being built throughout the country.

Measurements 'Inadequate'

When the gas boards realised that the small uneconomic producing units would have to be closed and that gas would have to be supplied over a wide area from a minimum number of large manufacturing stations, the industry soon saw that measurements made either with indicators or recorders, locally and out on the district, were going to be wholly inadequate for their needs.

The conditions at remote holder stations must be quickly made known to sub-divisional and divisional control centres, so that adquate arrangements could be made for the re-routing, or additional boosting of gas supplies to outlying stations, according to the demands being made and the state of the stocks. With the development of gas integration and grid schemes, therefore, the advance in the use of instruments in telemetering systems has been considerable, and much experience has been gained in the industry on various telemetering equipments, some of which work on voltage variation or current variation principles, while others rely on the use of variable frequency and direct current impulse apparatus.

The telemetering system which has received universal acclaim has been that operating on the time impulse principle, whereby the measured variable is transmitted as a function of time in a predetermined time cycle. By linking primary measuring devices to apparatus, which turns the measured variable into a time impulse, it has been possible to further link the transmitting device to modern electronic audio frequency oscillators. By using a separate fixed frequency oscillator for each separate measurement and by suitably choosing the range of frequencies, it is possible to transmit a large number of different readings over one pair of telephone wires without interference between the transmissions. At the receiving end, receivers tuned to fixed frequencies corresponding with those chosen for transmission, are set up and these receivers through relay mechanisms control the display units which reproduce on either an indicating scale or recording chart the variations in the measurement being made at the transmitting end.

The basic principles on which this equipment works are very well known to distribution engineers, but one point, however, which does need stressing is the reason why audio frequency electronic oscillators are used.

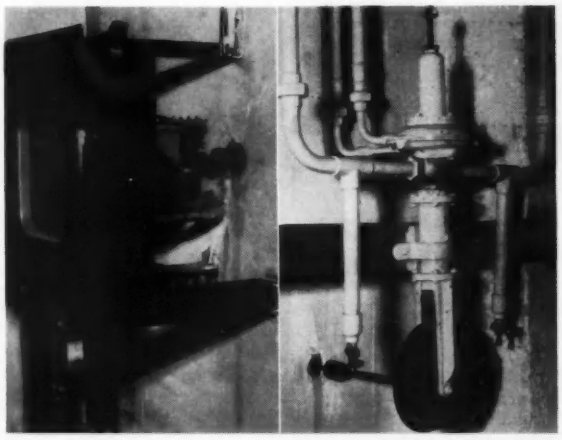
Simplified Gas Stock Measurement

The link between transmitting devices and receiving devices on all telemetering systems in this country is the G.P.O. telephone line and this is designed to carry the speech frequencies. To make full use of the telephone lines, therefore, any frequency generating apparatus to be used for the transmission of signals, should work in the audio frequency range and if good quality telephone lines are provided, many simultaneous audio frequency transmissions can be made over one pair of telephone lines without interaction, which will enable control signals to be sent from the control centre to the remote station simultaneously with the transmission of intelligence information from the distant point.

Holder stock measurement used to be made by a complicated system of ropes and pulleys working through a gear train on to the recording or transmitting device. The modern method is to make use of the change in pressure according to the elevation of a tank of liquid placed on the crown of the holder, linked with a hose pipe running outside the holder, to a pressure measuring device at the base of the holder or adjacent to the base in the transmitting instrument room. The early installations of such equipment employed water/glycol mixtures and the hose pipe was carried outside the holder suitably linked to guide rails. This method was only suitable for spiral guided holders because care had to be taken to see that slack hose did not accumulate at the base of the holder and cause obstruction or become fouled with other apparatus. On a spiral guided holder, the spare hose was taken up as the various lifts rotated in either their downward or upward movement.

Recently, however, attempts have been made to place the hose pipe inside the holder and these attempts have proved successful and it is now possible to offer the hydrostatic method of holder stock measurement for both spiral and column guided holders by placing the hose pipe inside the holder, and taking pressure measurements by using conventional pressure measuring devices linked to the transmitting apparatus. Booster pressure, too, may be controlled from a distance. The constant pressure at the far end of a main can be controlled by the speed of pumping. The pressure at the distant point is measured and transmitted in the manner already described, to the pumping station where the receiving indicator and/or recorder is fitted with contacts and auxiliary relays which in turn are connected to the booster motor through speed control motors.

If the transmission of the signal to the controller fails from any cause there would be an uncontrolled rise in speed, so provision is made for inhibiting the auto control and giving an alarm should this occur. During fault conditions or at any time that it is required to over-ride the auto control, the auto-manual switch can be moved to bring push button switches into use, which are inoperative when the switch is in the



Left: *Cycle-controller and inching motor on 'safe' side of governor house wall. Coupling is shown passing through gas-tight gland.* **Right:** *Pilot valve on volumetric governor actuating cam drive by control motor on other side of wall.*

'auto' position. In the manual position the timer is not in circuit and speed alteration is maintained as long as the button is depressed. The connections are interlocked to prevent the energising of both motor windings simultaneously. A method of controlling the setting of volumetric governors, too, has been evolved, employing the audio frequency equipment already described, together with a cycle controller and a cam on the pilot governor.

The conventional self-acting volumetric governor has been the subject of some criticism in gas circles and many attempts have been made to evolve other methods of achieving the same results. Once the decision to control the governor set point from a distance is taken, it becomes a question of whether the self-acting governor fitted with a mechanism for adjusting the set point by electrical signals, is the best way of dealing with the situation. A completely electric method would involve the use of an electrically operated valve, which would have to comply with the safety requirements and this presents considerable difficulties over size and expense.

Pneumatic or Electric Control ?

Compressed air, however, may be used for the valve operation and controller which, in spite of the cost of providing a compressor set, may compare favourably with the cost of a self-acting governor. The compressed air system has several advantages, namely:

A full proportional electrical control action can be provided, there are no explosion hazards, an air reservoir can ensure operation during power failures, valves can be arranged to close on air failure or at holder full position, the pressure loss across the orifice plate can be kept low as the differential does not have to operate a governor.

The controller is a standard instrument, giving a pneumatic output to the control valve according to the extent and direction of the departure from the desired flow. It is recommended that an integral (reset) action should be included in addition to the proportional action but derivative action is not likely to be necessary.

The controller is fitted with a set point adjustable by means of an air signal. This feature is known as an 'autoset.' While the air pressure applied to the 'autoset' remains constant, the flow controller maintains the flow constant by automatic adjustment of the control valve. A change in the value of the signal to the autoset produces a change in the set point at which the controller continues to maintain the gas flow.

The set point air signal emanates from a pneumatic transmitter coupled to a time-impulse receiver and this receives a signal from the control room set point transmitter by the standard method. The set point transmitter is fitted with an adjusting knob and index pointer moveable over a sector scale by the operator. The position of the index pointer is reproduced in the time-impulse receiver at the holder station and controls the value of the pneumatic output to the autoset device in the controller. A separate time-impulse transmitter and receiver are used to reproduce the flow reading at the control point. Recording may be carried out at the transmitting or receiving stations, but it is suggested that this should be done on the controller at the holder station so that, in the event of a transmission breakdown, the chart record continues uninterrupted. Integration is now conveniently carried out in the flow receiver at the control room. The flow controller and flow transmitter both operate from an air signal transmitted from a pneumatic differential pressure transmitter. This device gives the advantage of quick response, complete segregation of gas-connected equipment from electrical equipment and avoidance of the use of mercury.

In transmission failure owing to line interruption, electrical supply failure or apparatus failure, the set point receiver is arranged to maintain its last position, so that the flow control continues to operate. Normally a time-impulse receiver pointer is deflected off-scale on a failure of the incoming signal but in this case a synchronous motor driven time switch disconnects the receiver mechanism if no signal is received after 15 seconds. The equipment is re-instated automatically when transmission is resumed.

A wide selection of valve types is available for pneumatic operation and the choice will depend on conditions of pressure and flow in the incoming gas main. On low pressures a diaphragm motor (VEE-PORT) valve is suitable, provided that it is not required to have a dead-tight shut-off. In the case of high pressures and for obtaining complete shut-off, a plug valve with pneumatic motor can be used. Almost any type of valve preferred may be used by fitting a pneumatic power cylinder or motor.

The employment of audio frequency electronic apparatus is a step towards the modern conception of instrumentation, but there is now much more in the way of advanced instrument knowledge to be drawn on and to be placed at the disposal of the gas industry.

Data Reduction

The first part of this paper dealt with the need to make measurements, the method, the transmission over varying distances and the presentation of the information by conventional instruments, but an altogether new form of presentation of information has become available in very recent times and is generally known under the title of 'data reduction.' This method, is, briefly, the presentation on one sheet of paper of all the measurements being taken with facilities for summation or averaging, computation for correction of flow for changes in pressure and temperature, and the presentation of audible and visual alarm signals. Data reduction is therefore the automatic presentation of information and including such computation as will assist the operator in making early adjustment to correct plant operating conditions for maintenance of quality and/or quantity of each product.

The large scale growth and complexity of modern plants have outgrown conventional instrumentation, and it is not many years ago that a works management would have been proud of the tremendous size of their instrument control panels. With the added growth of the plant, however, such instrument control panels got out of hand and engineers soon demanded something which would enable the operators to gain a clear picture of the condition of the processes. From this desire grew the symbolic presentation of a plant in graphical form together with miniature instruments inserted in the flow lines. Considerable ingenuity in design was employed to produce small recorders, and instrument miniaturisation on graphic panels was the initial palliative enabling the human operator to assess plant conditions more readily.

Plant size continues to increase and becomes even more complex and the time is rapidly approaching when even the miniaturisation and graphic conception will no longer be within the capacity of the human operator and it is the recognition of this that has brought about the new technique for the collection of all data and the presentation of this on a single sheet.

It is becoming more and more important to run a process at optimum efficiency and as the designs of plant make use of improved techniques it is essential that the method of measure-

ment and the presentation of information keeps pace with the plant designer.

The manual logging of conventional instrument readings has long been the practice and in many respects very little action has been taken when the log has been presented, mainly because the need for action has passed and plant has resumed its normal working. It is, however, clear to the operator that could he have taken action at the time of the deviation, a very useful service would have been performed.

In a plant with very little capacity the rapid deviation of temperature can have very serious results on the quality of the product and the ability of data reduction equipment to present a large number of measurements on what is virtually a common time base is a tremendous asset. It should be noted that fifty measurements can be made and printed in sixty seconds.

It has long been recognised that a plant which has a number of single loop controllers could be improved in operation if by a change in conditions at one part of the plant the set points of the various controls could be readjusted for optimum efficiency. This overall control loop can of course be readily applied by use of a computer, but only when a formula has been obtained which relates the many variables associated with a plant. With the new tool of data reduction the simple presentation of information will now enable plant studies to be carried out and empirical formulae derived for eventual use in a computer.

The object of a data reduction system is to provide in digital form the measurement of process variables on a log sheet, punched tape, magnetic tape or punched card. The signals representing the measurements made in a plant must be presented to the data reduction equipment in an electrical form and at the equipment each measurement is scanned in sequence, measured, converted to digital form in the required scale, and printed on the log sheet and an alarm sounded if the measurement has deviated to an extent which justifies the alarm state. The printing of the information is initiated in two ways:

(a) The periodic log which may be 15, 30, 60 or 120-minute interval, or

(b) by the deviation of a measurement demanning an alarm.

There are other conditions under which printing takes place but these are generally 'on demand' by manual push-button. The number of variables measured and logged can be up to two hundred for one equipment, and the time for the complete operation would be approximately four minutes. If the equipment has been pre-set to log automatically at hourly intervals, the period in between hourly recordings would be taken up by the scanning mechanism which would compare the input values with pre-set potentials corresponding to high and low limits for each variable or for groups of variables, as the case may be. Where a deviation occurred an audible alarm would be sounded and the value of the deviating quantity would be measured and recorded, together with the time and code identity of the point.

The facility provided by data reduction in the presentation of hourly logs and deviations has led to an enthusiastic acceptance of the principle by a number of experienced engineers. It will be readily appreciated that an automatic data reduction system represents a considerable advance over the more usual method of manually recording figures by walking from point to point in a control room or even around the plant where the time between first and last reading could well be fifteen or more minutes.

By reducing delays in the presentation of essential information the correction by the human operator or feed back by automatic means for the purpose of improving plant conditions and product quality is made possible.

A very important aspect of data reduction is the greatly reduced instrumentation costs when the whole of the instrumentation and control room are taken into account. The amount of space occuped by data reduction equipment, including miniature indicators, is slightly more than half the space occupied by the conventional instrumentation in the shape of circular or strip chart recorders.

Method of Operation

For automatic logging purposes the electrical input data from the plant is sampled sequentially by the input selector switch, each input being connected in turn to the analogue digital converter. The completion of the digitising is indicated to the programming unit, and the converter output now in digital form is passed to a short term store via the scale factor unit. At this point a feed-back signal from the store to the programmer causes the selector switch to move to the next input, while the printer types the available information on to the log sheet. The programme unit also instructs the printer to move to the correct row and column and when the printing is completed it causes the store to be cleared for receiving the next information.

Where deviation detection is included the input channels are selected as before but at a much higher rate, and in parallel with this operation a second section of the switch samples inputs from pre-set potentiometers which are defining the high and low limits for each point. The plant input and set point values are then compared in the deviation detector unit, and if this shows that a limit is exceeded, an appropriate channel of the memory store records the event, at the same time the information is fed back from the memory unit to the programmer which in turn instructs the printer to record the off-normal value in red.

Once having stored the event in the memory a continuance of the alarm has no effect, but as soon as normal state is resumed the input, when compared with the memory, shows a difference which, by means of the programmer, causes the value and time to be recorded on the printer and at the same time clears the memory store.

The input signals to the data reduction system must be of an electrical character and therefore where measurements in the field are in a form other than electrical it is necessary to make a conversion by the use of an instrument called a 'transducer.'

Conversion to Electric Signal

The following are the main forms of measurement:

Direct measurement, measurement with a pneumatic output signal, measurement with an electrical signal, pulsed signal.

An example of pressure measurement is the use of the Bourdon tube, and it is a comparatively simple matter of design to add a differential transformer to the movement in order to provide an electrical output. To convert a pneumatic signal of the standard range of 3-15 lb. per square in. it is necessary to use transducer capable of accepting this signal and converting this into an equivalent electrical signal with very close accuracy. The measurement of flow may frequently include an electrical signal which is either proportional to the differential pressure at the orifice plate or has had the square law extracted providing a signal proportional to the flow. Other measurements which are made by means of an electrical output are those of temperature using either a thermocouple or resistance thermometer, gas analysis using instruments of the thermo-electric type or othe more complicated quantities, such as pH or viscosity.

The pulsed form of signal can be obtained from the vane type meter where a small magnet it attached to the vanes and as they rotate a current pulse is generated as the blades pass a fixed pole piece. The pulse rate provides a measure of the flow velocity, and the total number of the pulses generated provides a measure of the volumetric flow. The metameter instrument, which was described in the first part of this paper, can also provide pulses which are readily acceptable by the data reduction equipment. The differential transformer which is used for converting movement to electrical flow has a primary winding and two secondary windings; the core is movable and is attached to the motion of the measuring device. Movement of the core causes a differential output to occur at the terminals of the secondary winding.

The transducer which is used to transform the air output signal into an equivalent electrical signal, consists of a bellows which receives the air signal and operates an unbonded strain gauge. The total movement is extremely small and is of the order of a few thousandths of an inch, so that the effect of diaphram (spring rate) characteristics are virtually eliminated.

The simplest form of conversion employs the self-balancing bridge and disc type commutator. The input potential is applied to the self-balancing bridge, and the movement of the servo-motor during the balancing period rotates a shaft to which is coupled a disc commutator carrying a suitably coded contact pattern sensed by light brushes. The disc provides in effect one thousand divisions, each division represented by a separate contact pattern. From the disc brushes twelve

electrical leads are taken and by suitable coding each of the thousand divisions is separately represented and coding is so arranged that ambiguity is avoided when changing from one section to the next.

As the separate divisions of the commutator disc are coded, it is, therefore, necessary to decode the information before it can be used to operate the printer. This is usually done by a translator unit containing a relay or diode matrix. When the self-balancing bridge attains a state of balance, a current is passed through the disc commutator brushes for a brief moment only and the readings are taken to the translator unit. The translator unit then proceeds to select the correct digits before typing.

Under conventional instrumentation, the instrument is invariably scaled to suit the measurement, for example if the temperature to be measured is 920°C. the instrument would be scaled up to one thousand, and it follows that the automatic typing would have a similar refinement. Into the data reduction equipment is therefore built facilities for scale factors of one, two or five, and the appropriate scale factor is automatically selected for each measurement. Thus a measurement of 190 is placed on the 200 scale, a measurement of 450 is placed on the 500 scale and a measurement of 920 on the one thousand scale. This makes the best use of the available discrimination.

It will frequently be necessary to make corrections for non-linear characteristics which may occur in the measurement, in such cases as the e.m.f. characteristic of thermocouples or the square-root relationship in differential-pressure flow measurement. These corrections can be easily made by suitably loaded taps on the potentiometer of the self-balancing bridge.

Voltage Digitiser

Another type of digitiser which is also of the self-balancing type but does not employ the commutator technique, uses a series of resistor decades, the resistors being individually switched into circuit by relays or stepping switches. The arrangements of the varous contacts at balance will automatically be in digital form and parallel banks of contacts can be wired off to give different scale.

The digitising consists of comparing the input voltage quantity with a fixed level successively until identity from the nearest available fixed point is found. The number of this particular position will be the digital equivalent of the input voltage.

The process of comparison is carried out by stepping switches which may be of the Post Office uniselector type. The total number of steps to achieve balance may be greatly reduced by scanning the range first in large intervals, corresponding to the most significant digit first, and stopping the process when the digit reached exceeds the input voltage. A second ladder of resistance networks is then switched across this digit and is scanned step by step in a downwards or negative direction until a point is reached where balance has just been exceeded. The third network is then brought in and the units are each stepped up until balance is obtained. For decimal output it follows that the number of steps for three digit accuracy will involve a maximum of thirty but it will be appreciated that this is very much less than the nine hundred and ninety nine possible steps if they were all stepped in unit digit intervals. The disadvantage of this particular system is that it can deal only with single input law and any linearisation which is necessary must be carried out on the input before passing to the digitising stage.

With the two digitisers just described, the time taken to carry out the conversion is essentially the balancing time of the servo-mechanism, which is of the order of about one second. It should be borne in mind that the use of thermocouples plays a big part in industrial measurements, so it is quite normal for this type of servo unit to work with a full scale input of only ten mv and required discrimination of better than ten micro-volts. In general these types of digital converters, can give a very satisfactory performance, and allow easy servicing by an instrument engineer of average skill. The speed of conversion of one second is adequate for most purposes, and in any case is approaching the useful limit imposed by available typewriters. There are other methods of performing digital conversion by electronic means but these operate at such high speed that the recording must of necessity be placed upon magnetic tape.

Deviation Detection

The valuation of deviation detection will be appreciated when it is realised that with any plant under automatic control the process in normal operation stays, within close limits, at the point preset at the controller, so that the continuous recording of a mass of almost invariable data is of doubtful value, particularly as it may hide the occasional relevant point. Built into the data reduction equipment, therefore, are high and low set-points by means of which tolerances are preset, and any wander of the controlled variable in excess of these limits causes an alarm to be sounded and a record of the time, the identity of the point and the magnitude of the variation to be made.

Deviation detection is a relatively straightforward function since it is only difference detection and not precise measurement which is involved. Each input is scanned in turn and compared with its set-point limits, and an alarm is only given if these are exceeded in value. For this purpose, a simple chopper amplifier capable of working at an input level of a few micro-volts and a phase-sensitive rectifier are adequate. The output from the phase-sensitive rectifier is fed to the 'off-normal' memory unit which provides channel identification alarm and in turn forms a programme unit. An arrangement of this type will work at about five to six inputs per second at thermocouple level.

If the set point level calibration is required at high accuracy the calibration is carried out by using the digital equipment and display. Operation of a manual switch feeds the set-point value into the digitiser and the digitised value of the set-point may be automatically printed or displayed visually.

The normal recording medium is an electric typewriter or printer which produces a printed log sheet. The programme can be set to provide logging at any prescribed interval, but this is usually once per hour. In between logging periods a scan for deviation takes place continuously or at five minute intervals. Ordinary electric typewriters have certain shortcomings because they were developed for the purpose of typewriting letters and only later modified for remote operation, but even this modification still left much to be desired in a machine which must essentially operate for long periods without supervision. A machine is now available, however, which has been designed expressly as a remotely controlled automatic printer, and its special features include a positive motor drive for positioning the carriage and rotating the platen. Movement of the carriage and platen causes wipers to make contact and feed back information to check that the machine has correctly carried out the operation. The machine has a capacity of 400 characters per line and can operate at 20 characters per second, so that the record can be made at high speed and with reliability.

Apart from regular hourly recording, the following features are available:—

(a) On demand log at any time.
(b) Off-normal conditions are recorded in red on an off-normal section of the chart together with the identity and time of occurrence.
(c) At the start of a shift (or at any time) the whole of the set-points may be typed out on demand and a summary of off-normals can be presented by the depression of the appropriate manual push-button.
(d) At the end of a 'shift' totals of flows can be typed out together with averages if required.

And so a vast amount of information of great value to the management and printed on a single sheet of paper is available and ready for easy assimilation.

Data reduction offers striking possibilities beyond its immediate use as a measurement and data presentation device. The operation of a plant for optimum efficiency can be established from an investigation of actual plant behaviour and an analysis of the measurements may be made on some form of computer. The data reduction system will produce a punched tape or card (simultaneously with the typed record) which can be fed directly into a computer. As the knowledge gained of plant behaviour grows, computers can take over from the human co-ordinators and apply control more quickly and with improved accuracy.

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OPERATORS required with experience in Gasworks practice who are willing to travel. Generous living out allowances and leave. Pension, Insurance and Bonus Schemes in operation. Write giving education particulars, present position, etc., to W. J. Jenkins & Co., Ltd., Beehive Works, P.O. Box No. 3, Retford, Notts.

COKE OVEN CHEMIST is required for an integrated Iron and Steel Works in the Midlands. Applicant should have experience of Modern Coke Oven Plant. Some shift work is involved. Housing prospects are good and the successful candidate will be required to join the Staff Pension Scheme. Please apply, stating age, qualifications, experience and salary required to: Manager/Personnel, Stewarts and Lloyds, Limited, Corby.

HEATING AND COMBUSTION ENGINEER required by well-known Chemical Engineers in Victoria. Duties will include design and technical sales of a wide variety of heat using plant. Qualications required are B.Sc. or equivalent and at least three years' experience in Industry. The position is permanent, pensionable, and offers good prospects. Write stating age, experience and salary required to No. 300, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

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APPOINTMENT OF CHIEF DRAUGHTSMAN

THIS old-established firm of gas and chemical engineers require the services of a CHIEF DRAUGHTSMAN with a view to his ultimate appointment of Chief Engineer.

Applicants must have had experience in the gas industry and a knowledge of associated chemical plant and will be required to take charge of staff dealing with design, estimating and detail work. Membership of recognised technical institutes would be advantageous.

This important pensionable appointment will carry appropriate remuneration and assistance will, if required, be given towards finding suitable accommodation.

Apply stating age, full particulars of experience and present salary to The Secretary, Manchester.

EAST MIDLANDS GAS BOARD

LEICESTER AND NORTHANTS DIVISION
VACANCIES FOR LOCAL SUPERINTENDENTS/MANAGER

APPLICATIONS are invited from suitably qualified persons for the under-mentioned vacancies, at commencing salaries within the grades stated. The successful applicants will be required to reside in the houses attaching to the appointments, which will be available on reasonable terms under standard Service Occupation Agreements.

LOCAL MANAGER, KETTERING (Grades APT. 9/10, £755-£920).

Kettering is a non-manufacturing Unit comprising some 11,300 consumers, within the Wellingborough Group.

The house is semi-detached, three bedroomed, in residential district.

LOCAL SUPERINTENDENT, MELTON MOWBRAY (Grades APT. 6/7, £610-£750).

Melton Mowbray is a non-manufacturing Unit comprising some 4,500 consumers, within the Leicester Group.

The house is detached, four bedroomed, adjacent to the Station.

LOCAL SUPERINTENDENT, OAKHAM (Grades APT. 5/6, £575-£690).

Oakham is a non-manufacturing Unit comprising some 1,450 consumers, within the Leicester Group. The Local Superintendent would, in due course, be required to undertake certain standby duties, on a rota basis, in connection with the grid reception/holder station, for which an appropriate payment would be made.

The house is detached, four bedroomed, adjacent to the Station.

These appointments are pensionable, and the successful applicants will be required to pass a medical examination.

Applications stating age and present position, and giving details of education, qualifications and experience, together with the names of two referees, should be addressed to reach the undersigned not later than Wednesday, November 28, 1956.

H. B. TAYLOR,
Divisional General Manager.

Gas Offices,
Millstone Lane,
Leicester.

November 5, 1956.

NORTH WESTERN GAS BOARD

LIVERPOOL GROUP
ASSISTANT ENGINEERS (PRODUCTION)

APPLICATIONS are invited for the above two pensionable appointments at salaries within Grades A.P.T. 8/12 (£710/£1,025 per annum) according to qualifications and experience.

The successful applicants will be attached to various sections within the Group and will be employed essentially in the production of gas and other products. Applicants should be members of the Institution of Gas Engineers or be otherwise suitably qualified. A degree in engineering would be an additional advantage.

Applications should be made on the official form obtainable by writing to the Chief Personnel Officer, N.W.G.B., Liverpool Group, Radiant House, Bold Street, Liverpool, and returned to him within 14 days.

SCOTTISH GAS BOARD

WESTERN GROUP
BARRHEAD DISTRICT
APPOINTMENT OF TECHNICAL ASSISTANT

APPLICATIONS are invited for the above position at a salary in accordance with Grade A.P.T. 5, Provincial 'A' (£575-£655).

Applicants should have a sound knowledge of Gas Works practice including carbonisation in Continuous Vertical Retorts.

The position is pensionable, and the successful applicant will be required to pass a medical examination.

Applications stating age, and giving particulars of education, training, experience and qualifications, should be addressed to Mr. A. Campoeil, District Manager, Gas Works, Barrhead, to arrive not later than Saturday, November 30, 1956.

SCOTTISH GAS BOARD

NORTHERN DIVISION
INVERURIE DISTRICT

APPLICATIONS are invited from suitably experienced and qualified persons for the position of DISTRICT MANAGER at Inverurie.

The salary applicable to the post is in accordance with the Board's scale of salaries Provincial "B" A.P.T. 8 (£695-£775) with house to rent.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age, and giving particulars of education, training, experience and qualifications should be addressed to the undersigned to arrive not later than Saturday, December 8, 1956.

H. S. MILNE,
Divisional Controller.

50, Cotton Street,
Aberdeen.

November 13, 1956.

SCOTTISH GAS BOARD

DUNDEE GROUP

APPLICATIONS are invited for the following appointments within the Dundee Group:—

(1) DISTRICT MANAGER, MONTROSE.—Applicants should be corporate members of the Institution of Gas Engineers or have equivalent qualifications and be experienced in the management of a Gas Undertaking with practical experience of the control of vertical retort settings, distribution practice and general commercial routine. The salary applicable to the post will be on the Scale £1,025 to £1,145, and a house is available to rent.

(2) DISTRICT MANAGER, BRECHIN.—Applicants should be corporate members of the Institution of Gas Engineers or have equivalent qualifications and be experienced in the management of a Gas Undertaking with practical experience of the control of vertical retort settings, distribution practice and general commercial routine. The salary applicable to the post will be on the Scale £885 to £1,010, and a house is available to rent.

(3) TECHNICAL ASSISTANTS—Arbroath and Brechin.—Applicants should be suitably qualified and have experience in modern methods of gas manufacture and distribution. Salaries for the positions are in accordance with the J.I.C. Scales as follows:—

Arbroath—A.P.T. 6 (Provincial A) from £610 to £690.

Brechin—A.P.T. 6 (Provincial B) from £595 to £675.

The above positions are all pensionable and successful applicants will be required to pass a medical examination. Applications stating age and giving particulars of education, training, experience and qualifications together with the names of two referees, should be addressed to the undersigned for receipt not later than December 3, 1956. W. S. Johnston, Group Manager, The Scottish Gas Board, 50, East Dock Street, Dundee.

SCOTTISH GAS BOARD

KILMARNOCK GROUP
ANNAN DISTRICT
APPOINTMENT OF DISTRICT MANAGER

APPLICATIONS are invited from suitably qualified persons for the post of DISTRICT MANAGER of the Annan District Gas Undertaking.

Applicants must be experienced in the administration and supervision of a gas undertaking and possess a sound practical knowledge of horizontal retorts, distribution practice and general office routine.

The salary applicable to the post will be within A.P.T. Grade 9, Provincial 'B' of the Salary Scales of the National Joint Council for Gas Staffs (£740-£840), with placing according to qualifications and experience.

The successful applicant will be provided with a house at a reasonable rent.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age, and giving particulars of education, training, experience and qualifications, should be addressed to the undersigned to arrive not later than 14 days from the appearance of this advertisement. The names of two referees should be given.

ROBERT FIFE,
Group Manager.

Riverbank Gas Works,
Kilmarnock.

November, 1956.

WEST MIDLANDS GAS BOARD

WORCESTERSHIRE/HEREFORDSHIRE DIVISION
VACANCY FOR
ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the above post, which is located in the Divisional Offices at Worcester.

Candidates must be experienced in general engineering draughtsmanship and should have knowledge of the design and construction of gasworks plant and buildings.

The salary will be in accordance with A.P.T. Grade 9 (£755-£855 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with details of present and previous employment, should be addressed to Mr. C. F. W. Rendle, Divisional General Manager, West Midlands Gas Board, Newtown Road, Worcester, to reach him by not later than December 3, 1956.

J. C. INGRAM,
Secretary to the Board.

RADIATION, LTD., invite applications for the post of COOKERY DEMONSTRATOR who will be required to live in Birmingham and travel to all parts of the British Isles to give showroom and other demonstrations. The minimum requirements are a two-year training in Domestic Science, one year's demonstrating experience. Initial training in our methods will be given.

Applications giving details of education, training, experience, age and salary expected should be sent to Technical Staff Appointments Officer, Radiation, Ltd., Thimble Mill Lane, Aston, Birmingham, 6.

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UNUSED 48 in. Glenfield & Kennedy all iron Sluice valve, flanges 55½ in. diam., 28 holes, or 53½ in. P.C.D. 2 ft. 3½ in. long over flanges. Reasonable in price.—Cleckheaton Engineering & Motor Co. Ltd., Cleckheaton. 'Phone 397.

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The Midland Iron & Hardware Co. (Cradley Heath) Ltd., Cradley Heath, Staffs. Tel.: Cradley Heath 6264 & 5.

FOR SALE

SPECIAL Offer of Jeavons-Emco Socket Clamps subject to prior sale.

				Price Each
42—for	3″	Cast Iron Pipes Class B, C or D		2/0
24—for	4″	Ditto		2/6
24—for	6″	Ditto		4/0
300—for	8″	Ditto		4/0
25—for	10″	Ditto		6/0
18—for	12″	Ditto		8/6
144—for	6″	Steel Pipes 6¼″ O/D	.....	3/0
40—for	8″	Ditto 8¼″ O/D	.....	4/0
15—for	10″	Ditto 10¼″ O/D	.....	6/0
12—for	12″	Ditto 12½″ O/D	.....	6/0

Apply to Jeavons Engineering Company, TIPTON, Staffs. T/N. TIPTON 2161.

*THE RE-DESIGNED Western DOUBLE-FACED valve

British Patent Application No. 18892/53.
VENT PLUGS are provided for use when proof of complete isolation is demanded by safety requirements.
STAINLESS STEEL SPINDLE with improved indicator and gland assembly.
DISC GUIDES machined to perfect the parallel slide action of the valve.
NEW DESIGN of disc assembly incorporating disc levers loaded by cam-tensioned spring of stainless steel, easily accessible through inspection cover with the valve in the closed position.
FULL WAY features retained with improved adjustable wedge arrangement.
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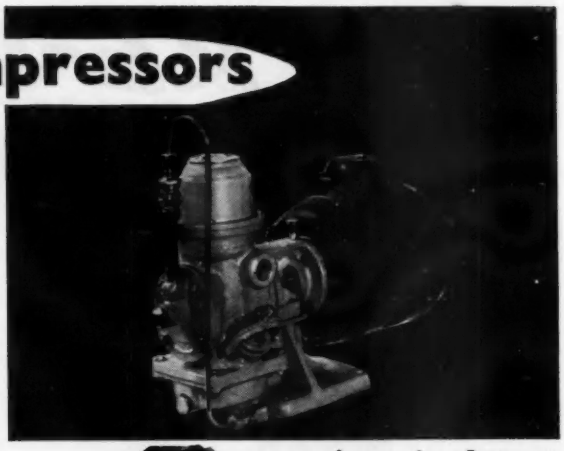


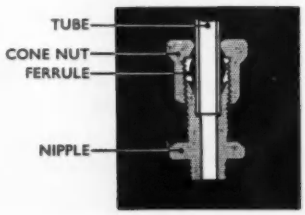
FOR COMPRESSING AIR OR GAS SUPPLIES USED FOR FURNACE HEATING, METAL MELTING, BRAZING, SOLDERING BITS, LAUNDRY IRONS, ETC.

DIRECT COUPLED COMPRESSORS (see *illustration right*) *are fitted with automatic internal by-pass valves and lubrication systems. They are direct coupled to Keith Blackman motors. Type OA compressors in this range occupy a floor space of only 18" x 7½".*
CAPACITY RANGE: *100 to 750 cub. ft. of gas or air per hour at 3 lbs. per sq. in. pressure.*

TYPE 4 COMPRESSORS (*not illustrated*) *are also fitted with automatic internal by-pass valves and lubricators. The complete unit includes motor and drive on a common bedplate, all of Keith Blackman manufacture.*
CAPACITY RANGE: *500 to 20,000 cub. ft. of gas or air per hour at 3-5 lbs. per sq. in. pressure.*
AREA OCCUPIED: *from 9½" x 16½" to 61" x 27".*

DID YOU KNOW?

KEITH BLACKMAN have been making compression joints for many years and the present design embodies features developed as a result of this long experience. *Notice that the shape of the ferrule is such that the joint is made without unduly stressing the tube.*



serving to burn

Note: the four burner heads (right) are for high pressure gas, or low pressure gas and air blast.

LEFT: "Fishtail" type burner *with two-armed stamped pattern injector for heating liquid in tanks by submerged combustion tubes. For use with low pressure gas supplies.* ***Size Range:*** *1", 1¼", 1½", 2" and 2½" outlets.* ***Capacity Range:*** *45-280 cub. ft. of gas per hour.*

Brass non-blow-off head types: *deal with 5 to 10 cub. ft. of gas per hour.*

Stainless steel, "F" type head, burner: *deals with 8 cub. ft. of gas per hour.*

Perforated head type burner: *deals with 10 to 15 cub. ft. of gas per hour.*

Keith Blackman LIMITED
MILL MEAD ROAD, TOTTENHAM, LONDON, N.17
Phone: Tottenham 4522 (twelve lines) Grams: "Keithblac, Norphone, London"
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INDUSTRIAL GAS EQUIPMENT

524

M & M PATENT METER LOCKS

use the STRONGEST, SAFEST METER LOCK

- **DON'T** buy locks you may have to scrap in a few years
- **DON'T** look only at the initial cost
- **DON'T** think only of the present time; look to the future
- **DO** remember that good quality is cheapest in the long run
- **DO** take our word for it that our workmanship is consistently good
- **DO** profit by others' experience and use M. & M. Locks to protect your meters

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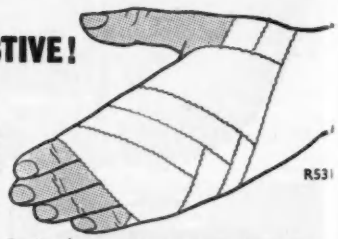

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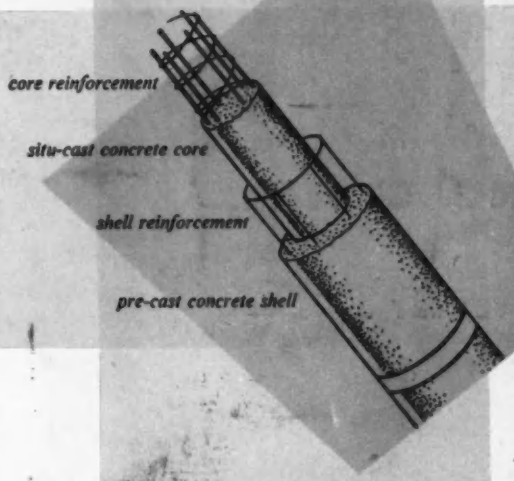
Worth remembering....



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20 in.	15 in.	3 ft 0 in.	70—100
17½ in.	12 in.	3 ft 0 in.	50—60
14½ in.	10⅞ in.	4 ft 0 in.	30—40

* *Depending on length of pile and strata conditions*

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G2